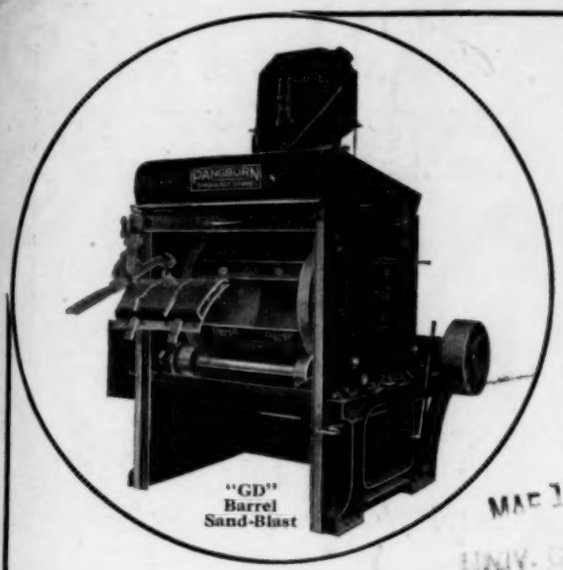
THE IRON TRADE REVIEW

Single Copies 15 Cents | CLEVELAND, MARCH 14, 1918 | Four Dollars a Year



"GD" Barrel Sand-Blast

2000 pounds Cored Brass Valve Bodies
Cleaned in This Barrel—1 operator in 1 hour

MAR 15 1918.

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Problems of Scarcity and High Cost of Labor are Solved by These PANGBORN Automatic Dustless Sand-Blast Machines.

Prepare to cheerfully meet the next Draft, and help your Country by Keeping up your output and Conserving Man Power.

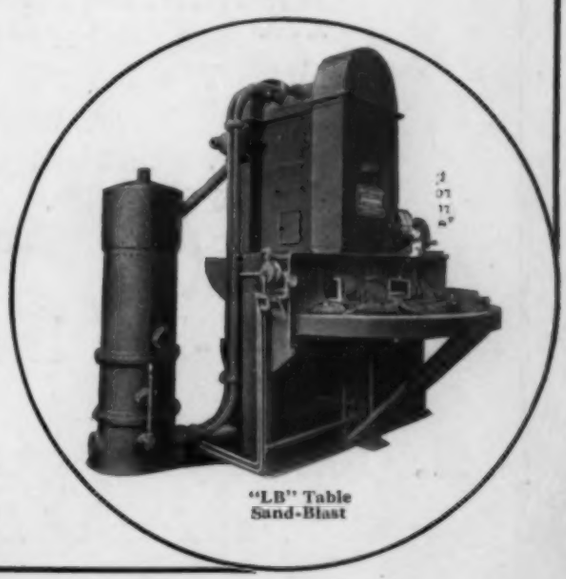
Investigate them *now* before delayed production means a big loss to you.

561 gears (up to 10½") cleaned on this Table
with one operator in 105 minutes.
This equals THE LABOR OF 7 MEN with Hose Sand-Blast.

PANGBORN CORPORATION
HAGERSTOWN, MD.
SAND-BLAST SPECIALISTS

P. O. Box 858

The largest Exclusive Manufacturers in the world of Sand-Blast and Allied Equipment (Experience, Capital and Facilities Unequaled)



"LB" Table Sand-Blast

Advertisers' Index, pages 162-163. Contents, page 73. "Where-to-Buy," page 84.
Engineering Directory, pages 128-129. Classified Advertisements, pages 138-161.

WASTE

IN good beehive practice, 1000 tons of coking coal makes 630 tons of furnace and foundry coke. All of the volatile products of the coal are wasted as smoke and dirt.

CONSERVATION

IN a by-product coke plant of Koppers Ovens, 1000 tons of coking coal will produce—

660 tons of high grade furnace and foundry coke

AND

50 tons of coke breeze for boiler fuel
10,000 gal. coal tar for furnace fuel or other uses
6,000,000 cu. ft. coal gas for furnaces, etc.
26,000 lbs. of ammonium sulphate for fertilizer
2000 gals. benzol for chemical uses and motor fuel.
400 gals. toluol for high explosives.

BENEFITS

MORE coke means more iron. Coke breeze means coal saved as boiler fuel. The coal tar will replace crude oil as fuel. The gas will replace 190 tons of coal used in gas producers. The ammonium sulphate will fertilize a large acreage of corn, wheat or cotton. The benzol as motor fuel would run a car 16,000 miles. The toluol would make 5200 lbs. of T. N. T. or enough to load 8600—3" shells.

Make By-Product Coke and Save Coal

H. KOPPERS COMPANY—Pittsburgh, Pa.

Builders of By-Product Coke Plants

THE IRON TRADE REVIEW

Vol. LXII Cleveland, March 14, 1918 *No. 11*

Costs Will Determine Price Action

Iron and Steel Producers to Display Increased Operating Outlay at Washington Conference—Lake Ore Interests Show Vanishing Profits—Operations Working Back to Normal—Urging Iron Division on War Lines

PRODUCTION costs are to be brought strongly into the determination of the question whether present iron and steel prices will be reaffirmed or revised by the government April 1. A conference at Washington, arranged for next Wednesday, March 20, between representatives of the industry and the war industries board will deal largely with this phase of the subject. It is apparent that producers will lay much stress upon the sharp upward rise in their operating outlay in recent months. An illustration of this line of procedure is given by the detailed data to be presented by independent producers of Lake Superior ore. Cost sheets covering the output in October and November of 5,000,000 tons of bessemer and nonbessemer ore from Mesabi underground mines show an exceedingly slender profit. It is set forth that this will be more than wiped out in 1918 if the 1917 price is reaffirmed. Similar estimated losses in 1918 are disclosed for Menominee and Gogebic underground mines. The Marquette properties would be the only ones to return a net profit this year and that a small one.

Contend For Pig Iron

Conflicting claims of consumers upon merchant pig iron capacity, sharpened by the present shortage of supply, promise to force an airing at Washington. An organized canvass of the foundry industry now is being made to determine to what extent its capacity is being devoted to war production. This survey is to furnish data to offset the movement by steelworks buyers to have foundry furnaces changed over to basic iron. The conviction grows steadily that the government must exercise a more positive control over iron production and distribution in accordance with war needs.

Joined with the question of the division of iron output are the heavy needs for government castings now taking form. The impossibility of procuring acid steel castings for all purposes because of the limited supply of low phosphorus iron has brought about comprehensive experiments with the use of malleable iron. Satisfactory physical tests have been obtained for malleable motor truck wheels. This is the first time this grade of iron has been used in this service. For the wheel sets for 25,000 trucks, about 12,500 tons of castings will be required. With the adoption of standardized freight car types now in sight, another tremendous requirement of castings will be brought forward. If 100,000 cars are ordered, this means a minimum of 400,000 tons of castings.

The demand for basic continues to pile up in all directions. The week's new inquiries include 40,000 tons for St. Louis, 20,000 tons for an Ohio river buyer, 10,000 tons for central Ohio and other lots.

Output Now Coming Back

While generally a freer traffic movement is reported, operations still are harrassed by car shortage. Mill stocks of tin plate, despite the active intervention of the food administration to maintain shipments are piling up rapidly. Sheet mills are running around 50 per cent and wire plants at about 80 per cent. Plate production has been maintained on a high plane. Operations in the Pittsburgh and Youngstown districts last week show 91 per cent activity for coke ovens and open hearth plants 92 per cent for blast furnaces and 81 per cent for bessemer works. The Steel corporation is producing iron at the rate of about 83 per cent and steel at about 87 per cent.

Fixed Prices Cut Wages

Sheet and tin plate workers have suffered the first cut in wages, amounting to about 2 per cent, under the reduced government price schedule. The bi-monthly examination disclosed an average selling price of 5.35c for Nos. 26, 27 and 28 black sheets, or $3 per ton under the previous settlement. The present government price is 5c for No. 28 gage. The average tin plate price was $8.40 per base box, against $8.60 two months before. The fixed price is $7.75. Curiosity is aroused as to how this and future sliding scale reductions are to be reconciled with the President's original stipulation of Sept. 24, that manufacturers were to maintain the existing levels of wages.

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EDITORIAL

Let National Needs Dictate

APPRECIATION of impending famine in pig iron with which the country must deal this year, according to present statistics, is stirring precautionary action. The foundry interests especially are being aroused to the growing danger of a contraction of their future supplies. This threatened development has been brought more clearly before the gray iron and malleable shop by the efforts of steelmaking interests to have foundry furnace capacity changed over to basic mixtures, to satisfy their unfilled needs at the expense of foundry production.

The American Foundrymen's association has undertaken a survey of its membership to determine the exact proportion of their capacity that is being devoted to essential war production. This data is to be laid before the government with the claim that adequate producion of foundry and malleable pig iron be preserved for these requirements.

The recent tendency of merchant pig iron production of the country has been away from the foundry and toward the steelmaking grades. The war which has been marked by an insatiable demand for steel has quickened this movement. Furthermore there has been a removal from the market of various selling stacks through their having been booked up with steel works capacity. Total iron production in the first half of 1917 was practically 360,000 tons less than in the first half of 1916. This loss was more than included in the 484,000 tons decrease in foundry iron production practically all of which is of merchant character. Basic in the same period lost 210,000 tons, but bessemer and low phosphorus, probably due to heavy export demand, increased in the amount of 202,000 tons and forge 29,000 tons.

That recent events will necessitate a weighing by Washington of the relative claims for recognition of both steelmaking and foundry iron buyers under war conditions is a wholesome outcome. The available supply of iron for all legitimate war needs should be ample. The danger has existed in buyers of one class getting more than their just share because their case had been put more vigorously and their need has been more conspicuous from a military viewpoint. Those charged with the war management of industry iron are to have the opportunity to survey all branches of demand upon merchant iron capacity, and render a decision.

This should enable them to effect the most equitable division of tonnage as dictated by immediate necessities. In no other way can the present situation be harmonized. In doing so, they will be fulfilling their true function. There must be no conflict where the nation's best interests are involved.

Discards Fill Growing Function

HEAVY tonnages of discard steel are being used in various lines of manufacture, including light rails, shovels, agricultural shapes, large-sized nails and reinforcing bars for concrete. Tests being made have given encouraging indications that it can be used as a source of supply for other finished lines the output of which has been greatly restricted owing to a shortage of rerolling material. The practice of using discard tonnages as scrap still is common but not so much so as it has been. It is noticeable that offerings in the market are smaller, showing that this material is being consumed by its producers.

A large portion of the discard steel is high in carbon and represents the croppings from open-hearth steel to be finished into munitions. Severe specifications provide for the cropping of from 25 to 30 per cent of the ingot. To this is also added approximately 5 per cent cropping necessary in ordinary practice. It is not possible to say what the discard tonnage amounts to in the absence of figures showing the requirements for ammunition steel but it is very large. The open-hearth ingot production annually being approximately 30,000,000 tons, it is apparent that the discards run into large figures. Its tensile strength has made it particularly adaptable to different lines of manufacture, as pointed out, with the prospect that it will be converted into additional forms of production.

This is a partial solution to the problem of steel shortage, which the trade has been and is facing. It offers another interesting phase of diverted tonnage that has resulted from war conditions.

High Records Bring Reactions

MAINTENANCE of a maximum level price or production never can be achieved. All curves based on data of this kind show recessions after high altitudes have been reached.

From the beginning of 1915 practically all curves, both of production and price, tended upward, making new high levels. The peaks culminated about the third quarter of 1917. The government then stepped in and set maximum prices which effected a drop in all the price lines. Production curves continued high until interference with fuel and transportation at the beginning of this year changed them precipitately

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downward. As a result of these two factors of price and tonnage, the curves of financial affairs will be brought down in reports for the first quarter of 1918 and the cycle will be complete. The inter-relation of these various factors of the market is absolute and when one or more is affected there is a corresponding change of the others.

The peaks of 1917 seem likely to remain as records for years to come. How near they may be approached in the next year or two remains to be seen and no man can predict with assurance. It is expected that record production levels will be attained again but if demand is slack, this will operate to depress prices. Removal of government regulations with a heavy demand maintained, will send price levels upward, but how far is difficult to predict.

Preserve Efficiency of Competition

A WARNING against the over-standardization of railroad equipment is carried in a letter recently sent to W. G. McAdoo, director general of railroads, by the Railway Business association, a national organization of manufacturers of railroad appliances. The letter pointed out that two antagonistic requirements must be compromised—improvement through change and stability through standardization. At present there is considerable apprehension expressed that, under the government's broad plan of standardization, a large number of manufacturers of established competing devices will be, temporarily at least, wiped out of existence, or, in more concrete terms, that the appliance of one manufacturer will be adopted as a standard to the exclusion of all others, thus eliminating competition which has long been the chief factor in the development of transportation science.

In recent years much has been done in the way of car standardization, although principally with regard to dimensions, and as a result, the inter-line use of cars has been made possible. This, in turn, has resulted in a tendency toward the interchangeability of parts, until today a device of any established patent can be placed on the modern freight car. Such also has been the development along the lines of interchangeability, that little delay is occasioned in the production of cars in the substitution of one patented device for another, according to the preferences of the particular buyer. It would seem that the work of the appliance makers, while continually furthering transportation science in various single instances as a result of keen competition, is sufficient in scope to meet all practicable demands that now may arise. It is important that Mr. McAdoo in the interests of standardization does not undermine an established industry which has proved its practical worth. The safest and fairest way is to let the respective roads use their judgment in specifying standard devices as in the past.

Stamp Out Labor Profiteering

COMPARABLE only to the unreasonable and unreasoning demands of the Bolsheviki, is William L. Hutcheson's demand as president of the carpenters' and joiners' brotherhood, that eastern shipyards be operated on the closed shop principle. Un-American as such operation would be, Mr. Hutcheson would use the crisis in which the country finds itself to foist this yoke upon a rapidly expanding industry. Serious curtailment of the shipping program only has been avoided by the timely intervention of President Wilson. The President's pleas resulted in sending back to work several thousand men who had already struck and keeping on the job others preparing to follow their lead. Wages and working conditions, including living quarters were some of the points advanced by strikers for their action. Submission of their differences to arbitration will follow and an amicable solution will be reached, but from latest advices, Mr. Hutcheson claims they will insist that closed shop principles must be upheld.

At this hour, after 10 months of preparation on our part, and 10 months of waiting on the part of our allies, we have reached a point where we are ready to contribute a share commensurate with our resources, toward the victory which must come. What is needed is ships. If ship construction is delayed, not only is victory delayed, but the aid which our men in the field need now and will need in increasing measure, will be withheld.

Possibly Hutcheson has no family connections in uniform, but doubtless many of the men he called and would call to strike, have relatives who have answered the country's appeal to its manhood. Are these going to fight against their own flesh and blood to uphold a principle which, based on coercion and interference, never has meant such deadly peril to the nation's security. The sacred duty is for every man to fill his job to the utmost of his ability. Labor profiteering is just as abhorrent as any which would exact large profits from the nation's extremity. The government should make no distinction in treating the profiteers of either labor or capital with a strong hand, and no temporizing should be permitted.

Iron and Steel Prices

Corrected to Wednesday Noon

SCRAP, WAREHOUSE AND IRON ORE PRICES ON PAGE 638

PIG IRON

Bessemer, valley	$36.30
Bessemer, Pittsburgh	37.25
Basic, Pittsburgh	33.95
Basic, eastern Pa.	33.00
Basic, Buffalo	33.00
Malleable, Pittsburgh	34.45
Malleable, Chicago	33.50
Malleable, Philadelphia	34.00 to 37.50
Malleable, Buffalo	33.50

GOVERNMENT SCHEDULE

1.75 to 2.25 silicon (No. 2 foundry, No. 2 plain, and No. 3 southern), $33 furnace base.

2.25 to 2.75 silicon (No. 2X, No. 1 Northern foundry, and No. 2 southern), base plus 50c.

2.75 to 3.25 silicon (No. 1X, No. 2, soft), base plus $1.50.

Over 3.25 silicon, $34.50, plus $1.00 for each ½ per cent of silicos.

No. 1X, Phila.	35.25 to 35.50
No. 2 foundry, Pittsburgh	33.95
No. 2 foundry, Cleveland	33.95
No. 2 foundry, Ironton	33.00
No. 1 foundry, Chicago	33.50
No. 2 foundry, Chicago	33.00
No. 2X foundry, Phila.	34.25 to 34.50
No. 2X foundry N. J. tide	34.25 to 34.50
No. 2X foundry, Buffalo	33.50
No. 2 plain, Philadelphia	33.75 to 34.00
No. 2 plain, N. J. tide	33.75 to 34.00
No. 2 southern Birmingham	33.00 to 33.50
No. 2 southern, Cincinnati	36.40
No. 2 southern, Chicago	37.50
No. 2 southern, Phila. del.	38.30 to 39.40
No. 2 southern, Cleveland	37.50
No. 2 southern, Boston	39.50
No. 2 southern, St. Louis	35.90
Virginia, No. 2X, furnace	33.50
Virginia, No. 2X, Phila.	36.77
Virginia, No. 2X, Jersey City	37.02
Virginia, No. 2X, Boston	37.27
Gray forge, Pittsburgh	32.95
Silveries, 8 per cent, furnace	46.00
Silveries, 8 per cent, Chicago	48.54
Low phos. standard, Phila.	55.00 to 56.00
Low phos., Lebanon furnace	50.00
Low phos., Pittsburgh	53.00
Charcoal, Superior, Chicago	37.50
Charcoal, Superior, Buffalo	39.75
Charcoal, southern furnace	43.00

COKE

(At the ovens)

Connellsville furnace	$6.00
Connellsville foundry	7.00
Pocahontas foundry	8.00
New River foundry	8.00
New River furnace	7.00
Wise county furnace	6.00
Wise county foundry	7.00

FERROALLOYS

Ferromanganese, delivered	$250.00
Spiegel, 20 per cent fur.	65.00
Spiegel, contracts, furnace	65.00
Ferrocarbon titanium, carloads, maker's plant	160.00
Ferrosilicon, 50 per cent, first quarter, Pittsburgh	175.00 to 180.00
Ferrosilicon, 50 per cent, Pitts., remainder of 1918	155.00 to 175.00
Bessemer ferrosilicon, 9 per cent.	$54.00
Bessemer, ferrosilicon, 10 per cent.	55.00
Bessemer ferrosilicon, 11 per cent.	58.30
Bessemer ferrosilicon, 12 per cent.	61.60

Ferrosilicon prices at Ashland, Ky., Jackson and New Straitsville, O.

SEMIFINISHED MATERIAL

BILLETS

Open-hearth, Pittsburgh	$47.50
Open-hearth, Philadelphia	50.50
Open-hearth, Youngstown	47.50
Bessemer, Pittsburgh	47.50
Bessemer, Youngstown	47.50
Forging, Pittsburgh	60.00
Forging, Philadelphia	63.00

SHEET BARS

Open-hearth, Pittsburgh	$51.00
Open-hearth, Youngstown	51.00
Bessemer, Pittsburgh	51.00
Bessemer, Youngstown	51.00

WIRE RODS AND SKELP

Wire rods, Pittsburgh	$57.00
Grooved skelp, Pitts.	2.90c
Sheared skelp, Pitts.	3.25c

SHAPES, PLATES AND BARS

(In cents per pound)

Structural shapes, Pitts.	3.00c
Structural shapes, Phila.	3.185c
Structural shapes, N. Y.	3.195c
Structural shapes, Chgo.	3.00c
Tank plates, Chicago	3.25c
Tank plates, Pittsburgh	3.25c
Tank plates, Philadelphia	3.435c
Tank plates, New York	3.445c
Bars, soft steel, Pittsburgh	2.90c
Bars, soft steel, Chicago	2.90c
Bars, soft steel, New York	3.095c
Bars, soft steel, Phila.	3.085c
Bar iron, Chicago	3.50c
Bar iron, Phila.	3.50c to 3.685c
Bar iron, Cleveland	3.64c to 3.70c
Bar iron, New York	3.695c
Bar iron, Pittsburgh	3.50c
Hard steel bars, Chicago	3.00c

RAILS, TRACK MATERIAL

Angle bars, Pittsburgh base	3.25c
Angle bars, Chicago base	3.25c
Standard bessemer rails, mill	$55.00
Stand. open-hearth rails, mill	57.00
Light rails, 25 to 45, mill	3.00c
Relaying rails, light, St. L.	60.00 to 67.00
Spikes, railroad, Pitts.	3.90c
Track bolts, Pittsburgh	4.90c
Track bolts, Chicago	5.115c
Tie plates, Chicago	3.25c

WIRE PRODUCTS

(Per 100 lbs. to jobbers; retailers 5c more)

Wire nails, Pittsburgh	$3.50
Coated nails, Pittsburgh	3.45
Plain wire, Pittsburgh	3.25
Galvanized wire, Pittsburgh	3.95
Polished staples, Pittsburgh	3.65
Galvanized staples, Pbgh.	4.35
Barb wire, painted, Pitts.	3.65
Barb wire, galvanized, Pitts.	4.35
Cut nails, Pittsburgh	4.00

CHAIN, PILING, STRIP STEEL

(In cents per pound)

Chain, ⅜ in. proof coil, Pitts. 8.00c

Sheet piling, base, Pitts. 4.00c to 5.00c

Cold rolled strip steel, hard coils, 1½ inches and wider by 0.100 inch and heavier, base per 100 pounds, 6.50c.

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SHEETS

(In cents per pound)

SHEET MILL BLACK

No. 28, open-hearth, Pitts.	5.00c
No. 28, bessemer, Pitts.	5.00c
No. 28, open-hearth, Chi.	5.215c

TIN MILL BLACK

No. 28, open-hearth, Pitts.	5.00c
No. 28, bessemer, Pitts.	5.00c

GALVANIZED

No. 28, open-hearth, Pitts.	6.25c
No. 28, bessemer, Pitts.	6.25c
No. 28, open-hearth, Chi.	6.465c

BLUE ANNEALED

No. 10, open-hearth, Pitts.	4.25c
No. 10, bessemer, Pitts.	4.25c
No. 10, open-hearth, Chi.	4.465c
No. 10, open-hearth, Phila.	4.435c

TIN PLATE

(Per 100 lb. box)

Tin plate, coke base, Pitts. $7.75

IRON AND STEEL PIPE

Base Pittsburgh

Base Pittsburgh	Black (Per cent off)	Galv. (Per cent off)
¼ to 3 in., butt, steel	51	37½
¼ to 3 in., butt, iron	33	17

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	30
Iron, 3½ to 4½ inches, c. l.	12½

CAST IRON WATER PIPE

(Class B Pipe)

Four-inch, Chicago	57.30
Six-inch and over, Chicago	54.30
Four-inch, New York	58.35
Six-inch and over, N. Y.	55.35
Four-inch, Birmingham	52.00
Six-in. and over, Birmingham	49.00

HOOPS, BANDS, SHAFTING

Class A pipe is $1 higher than Class B.

Hoops, Pittsburgh	3.50c
Bands, Pittsburgh	2.90c
Shafting, Pitts., carloads	17 off to list

RIVETS

Structural rivets, Pittsburgh	4.65c
Boiler rivets, Pittsburgh	4.75c
Rivets ⅞ in. and smaller, Pitts.	45 and 10 off

NUTS AND BOLTS

(Delivered within 20-cent freight radius)

CARRIAGE BOLTS

(⅜ x 6 inches, smaller and shorter)

Rolled thread	50–5 off
Cut thread	40–10–5 off
Larger and longer	40 off

MACHINE BOLTS

(⅜ x 4 inches, hot pressed nuts)

Rolled thread	50–10–5 off
Cut thread	50–5 off
Larger and longer	40–10 off
Cold pressed semi finished hexagon nuts ⅜ in. and larger	60–10–10 off
Cold pressed semi finished hexagon nuts ⅞ in. and smaller	70–5 off
Gimlet and cone point lag screws	50–10 off

NUTS

Hot pressed, square blank	2.50c off
Hot pressed, square tapped	2.30c off
Hot pressed, hexagon blank	2.30c off
Hot pressed, hexagon tapped	2.10c off
Cold pressed, square blank	2.25c off
Cold pressed, square tapped	2.00c off
Cold pressed, hexagon blank	2.25c off
Cold pressed, hexagon tapped	2.00c off

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago)

Quotation on leading products March 13, average for February, 1918, average for December, 1917, and average for March, 1917. Prices are those ruling in the largest percentage of sales at the dates named

	Prices March 13, 1918	Average prices Feb., 1918	Dec., 1917	Mar., 1917
Bessemer pig iron, Pittsburgh	$37.25	$37.25	$37.25	$37.45
Basic pig iron, Pittsburgh	33.95	33.95	33.95	32.85
*No. 2 Foundry pig iron, Pitts.	33.95	33.95	33.95	36.55
*No. 2, Foundry pig iron, Chi.	33.00	33.00	33.00	35.70
Lake Superior charcoal, Chicago	37.50	37.50	37.50	37.55
Malleable, Chicago	33.50	33.50	33.50	35.70
**Southern, No. 2, Birmingham	33.50	33.50	33.50	28.00
*Southern Ohio No. 2, Ironton	33.00	33.00	33.00	36.00
Basic, eastern Pa.	33.00	33.00	33.00	34.50
**No. 2X Virginia, furnace	33.50	33.50	33.50	34.00
**No. 2X foundry, Philadelphia	34.25	34.25	34.00	37.25
Ferromanganese, delivered	250.00	250.00	247.50	275.00
Bessemer billets, Pittsburgh	47.50	47.50	47.50	67.00
Bessemer sheet bars, Pittsburgh	51.00	51.00	51.00	67.00
Open-hearth sheet bars, Pitts.	51.00	51.00	51.00	67.00
Open-hearth billets, Pitts.	47.50	47.50	47.50	67.00
Steel bars, Pittsburgh	2.90	2.90	2.90	3.20
Steel bars, Chicago	2.90	2.90	2.90	3.40
Iron bars, Philadelphia	3.50	3.50	3.685	3.509
Iron bars, Cleveland	3.64	3.64	3.64	3.00

*1.75 to 2.25 silicon. **2.25 to 2.75 silicon.

	Prices March 13, 1918	Average prices Feb., 1918	Dec., 1917	Mar., 1917
Iron bars, Chicago mill	$3.50	$3.50	$3.50	$3.00
Beams, Chicago	3.00	3.00	3.00	3.65
Beams, Pittsburgh	3.00	3.00	3.00	3.45
Beams, Philadelphia	3.185	3.185	3.185	3.759
Tank plates, Pittsburgh	3.25	3.25	3.25	4.20
Tank plates, Chicago	3.25	3.25	3.25	4.60
Tank plates, Philadelphia	3.435	3.435	3.435	5.659
Sheets, blk., No. 28, Pitts.	5.00	5.00	5.00	5.05
Sheets, blue anld., No. 10, Pitts.	4.25	4.25	4.25	4.70
Sheets, galv., No. 28, Pitts.	6.25	6.25	6.25	6.70
Wire nails, Pittsburgh	3.50	3.50	3.50	3.15
Connellsville furnace coke	6.00	6.00	6.00	7.60
Connellsville foundry coke	7.00	7.00	7.00	6.90
Heavy melting steel, Pitts.	30.00	30.00	30.00	23.40
Heavy melting steel, eastern Pa.	30.00	30.00	28.75	23.75
Heavy melting steel, Chicago	30.00	30.00	28.90	23.00
No. 1 wrought, eastern Pa.	35.00	35.00	35.00	30.50
No. 1 wrought, Chicago	35.00	35.00	34.75	28.85
Rerolling rails, Chicago	35.00	35.00	35.65	27.25
Car wheels, Chicago	30.00	30.00	30.75	20.30

(For Additional Prices See Page 696)

Iron Distribution Becomes Problem

Washington Being Urged to Divide Tonnage in Accordance With War Importance —New Demands for Basic Total Many Thousand Tons—American Bridge Co. Buys 30,000 Tons of Resale Bessemer

Pittsburgh, March 12.—Extreme shortage of both steelmaking and foundry iron has led some prominent men in the trade to feel that the best solution to the problem of supply rests with distribution to consumers according to the importance of the war work in which they are engaged. It is understood that this plan has been taken up with authorities at Washington. Action along this line, it is pointed out, would dispose of the suggestion that has been made to the government that a certain capacity now making foundry iron be diverted to the production of basic iron. There is strong opposition to this in the trade, not only on the part of those who would be directly affected if this proposal were put into operation, but also by some who feel that the plan is not practical. They contend that foundries have government contracts whose importance is not transcended by those of steel plants. For instance, the argument is made that some foundries are casting parts for engines for the Emergency Fleet corporation. There is but a small production of foundry iron in this district at present. Blast furnace interests are disappointed in the slow improvement being made in the railroad situation. Curtailed production greatly has increased costs of operation and it is evident that interesting figures will be shown in this connection to the war industries board preliminary to the forthcoming price-fixing program. Confidence is felt that present levels will not be reduced. The general feeling is that present prices will be continued. Cost figures now are being compiled for submission to the board. Operations have increased somewhat. The Carnegie Steel Co. has 46 of its 59 furnaces producing compared with 41 one week ago. The National Tube Co. has active nine of its 11 furnaces and the Jones & Laughlin Steel Co. seven of its 11 furnaces. Consumers anxiously are seeking requirements, basic especially being in heavy demand, but sellers in this district are fully committed and have no available tonnages. One steel interest, it is said, would take 100,000 tons of basic if it could be secured but has been able to obtain only 2000 tons. Another steel producer, whose loss of furnace output has been heavy, would like to cover for almost any quantity of either bessemer or basic. Another melter is in the market for about 10,000 tons of basic for second quarter delivery.

Deliveries Much Improved

Boston, March 11.—The bright feature of the past week in the local pig iron situation, has been a marked improvement in deliveries. Shipments on government permits from all producing sections have increased so materially, plants working even as low as 30 to 40 per cent on government work no longer are hampered for want of iron. Deliveries to the so-called nonessential plants also are better. There has been no lifting of the embargoes on the railroads connecting with New England roads but in spite of this fact, there has been much improvement in transportation conditions, to which the 10 per cent excess loading of cars has been no small factor. New England melters undoubtedly are much better off than they were recently in the matter of supplies, but a number of in-

quiries for several thousand tons, for immediate and second quater delivery are current without a furnace to entertain them. A case is cited where an inquiry covering neutral iron was submitted to more than 20 furnaces, and brought but a single bid. The navy department is in the market for 700 tons for ballast but even so low a grade could not be had. It is hard to tell how much iron could be sold for prompt delivery but there is no doubt that it would foot up big, for there probably is not a melter in this section who did not underestimate his needs. Some furnaces are attempting to find out the future requirements of their regular trade, for it is realized that prorating will be necessary. Deliveries of Connellsville coke are poor; one shipment sent out in January was commandeered by the government at the New England gateway. On the ground that it was a cross shipment and the need should have been cared for by the New England Coal & Coke Co.

Sell Large Tonnages

Philadelphia, March 11.—The Penn Seaboard Steel Corp. finally has managed to place its second half requirements of basic pig iron. An eastern maker is understood to have closed a contract to supply this interest with approximately 25,000 tons, mainly for New Castle, Del. Another important transaction was the purchase of 30,000 tons of bessemer by the American Bridge Co. This iron, it is understood originally was sold for export but could not be shipped because of the embargo. Outside of these sales the market has been quiet during the past week. Other sales included limited tonnages of gray forge, off bessemer and off foundry, practically all for prompt shipment. None of the eastern furnaces are offering for second half. Second half inquiry has died down somewhat, due mainly to buyers' inability to get the iron, it is thought. The Sheffield Iron Corp. has about completed the rebuilding of its furnace at Sheffield, Ala., and expects to have it in operation about the middle of April. Its output, which is expected to be in excess of 200 tons of foundry per day, now is being offered over the remainder of the year. Considerable Sheffield iron already has been sold for delivery in the west. It is estimated that the Eastern Steel Co., which recently blew in one of its Warwick furnaces on standard low phosphorus, whil make between 15,000 and 20,000 tons. Of this 9000 tons have been requisitioned for the Tacony Ordnance Corp., Philadelphia, as previously reported, and 4000 tons for the Edgewater Steel Co., Pittsburgh. Several other consumers making government castings each want the remainder. The question of distribution has been submitted to the government. It is believed the supply of pyrites residue suitable for furnaces making copper-bearing low phosphorus iron will be sufficient to carry them through 1918. The growing difficulty of importing pyrites from Spain, however, indicates that unless the government provides for a continuance of shipments, production of this grade will be materially restricted in the first half of 1919.

No Tonnage to be Had

Buffalo, March 12. — Conditions practically have reached the stage in this district where there is no iron to be had. Only one producer sold any iron during the week just closed and this was a small amount. Furthermore, this interest is soon to retire from the market on account of its sold-up condition. Inquiry continues to flow in upon local makers, the aggregate being thousands of tons. Furnace interests are compelled to turn down their oldest customers, and it is said that practically every regular patron is pleading for some iron. The majority of the requests are for 2000, 2500 and 3000-ton lots. An inquiry of the Gould Coupler Co., for 15,000 tons of basic and 2000 tons of malleable which has been before the market for some time and still is unsatisfied, may have to be withdrawn. The most persistent inquiry is for third and fourth quarter delivery. The filling up of the commitment of the furnace first mentioned will practically close this district to further business for some time, because of three sellers remaining, one has not been taking on any tonnage for weeks; another has long been sending its pig iron to its own mills, and the third for the past few weeks has been out of the market. Furnacemen are straining every nerve to get out government shipments, loading by crane, hand and every method at their disposal. The car situation continues bad.

Inquiry Active, Few Sales

Cleveland, March 12.—Only a small part of the current inquiry for pig iron continues to be converted into sales. The reason is that the producers supplying this territory have not the metal for sale. A local maker who for several weeks has been selling to regular customers for last halt has accumulated a round tonnage of orders and now is picking business with great care. These sales mainly have been foundry and malleable, but this week an extra lot of 3000 to 4000 tons of basic which had been accumulated above this company's own needs were sold to an Ohio consumer. The last half situation on foundry and malleable is becoming increasingly serious as many of these buyers now inquiring find it almost impossible to get the furnaces to accept their orders. In this connection, makers who regularly book a certain tonnage of these grades report their order book is made up of a greater amount of basic and accordingly of a lesser proportion of foundry and malleable than usual. Notwithstanding the increased accommodation of basic requirements, unsatisfied inquiries of this kind still are piling up. New requests made this week call for 20,000 tons for an Ohio river works and 10,000 tons for a central Ohio consumer, both for last half. A Marion, O., buyer who asked 4000 tons for second quarter and last half has closed. Various other tonnages for Ohio and western Pennsylvania steelmakers remain before the furnaces. Government allocations this week have been small; only one or two light orders were placed. Interest in the market centers on the approaching government price action. In some quarters the possibility of a reduction in pig iron in order to work out an increase of the spread between semifinished and finished steel products has come in for serious consideration.

Sharp Scarcity at Chicago

Chicago, March 12.—Although last half production has been sold fully by local producers, large inquiry for all grades of pig iron continues to come out in this market. Malleable users apparently have need of considerable more iron than they have been able to contract and basic requirements are heavy. One inquiry by a St. Louis melter is for 40,000 tons of basic for last half delivery. Local producers have been unable to entertain this business. Other basic users are also in need. All merchant stacks in the Chicago territory, with the exception of one at Milwaukee are now active, but fuel conditions have cut down production and probably not more than 25 per cent of normal tonnage is being turned out. This has the effect of delaying deliveries somewhat, but every effort is being made to keep consumers supplied as well as possible. Southern producers are not selling freely, fuel conditions and uncertainty of delivered prices during the second quarter and last half apparently being a bar. Silveries and

bessemer ferrosilicon which could be bought up to within the last fortnight are now more difficult to obtain and some buyers have been unable to cover requirements.

Basic Is Allocated

New York, March 12.—Larger tonnages of pig iron are being distributed in the east by government direction. Buffalo furnaces during the past few weeks are understood to have been allocated through the Emergency Fleet corporation many thousands of tons of basic which are to go to works filling orders for the latter. The ordnance department is expected to place some large basic lots soon. It is reported that the Gould Coupler Co. has closed for 15,000 tons of second half basic, but this is not confirmed. Inability of consumers to bring out quotations has caused some falling off of foundry inquiry. Offerings continue mainly of off grades. Much interest has been aroused by the report that a large consumer with numerous plants recently made representations at Washington for a reduction in the price of pig iron allowable to southern furnaces.

Southern Offerings Larger

Cincinnati, March 11.—As the inquiry for southern foundry iron decreases, offerings of iron for second half shipment increase. Practically little No. 2 foundry for that delivery was to be had two weeks ago, but some now is quietly offered. The tonnage necessarily is limited and no sales of consequence have been made.

Basic Tonnage Closed

St. Louis, March 9.—In point of actual business transacted, the past week has been about the quietest which the pig iron market has experienced in 18 months. A fair scattered demand was reported, but sellers have virtually quit, having nothing to offer for any delivery. A recent basic transaction closed in the east involves 20,000 tons for last half to the National Enameling & Stamping Co., East St. Louis. This consumer still wants 10,000 tons for Granite City. Large tonnages have been sold in this market for first half delivery and quite a bit for the third quarter. For that period, therefore, needs are well provided, but decided apprehension is felt relative to later supplies.

Famine is Predicted

Birmingham, Ala., March 12.—Selling of pig iron in the south still goes on in small lots and mainly to regular customers. No trouble whatever is being experienced to dispose of iron and there is no inclination to sell indiscriminately.

Coke Traffic is Improving

Car Supply This Week Raised to 70 Per Cent—Furnace Receipts Still Inadequate—Pool Plan Not Yet Abandoned

Pittsburgh, March 12.—Improvement is reflected in the supply of cars in the Connellsville coke region. The average on the Monongahela for last week was only 43 per cent and yesterday and today was approximately 70 per cent. Whether or not this showing can be maintained is a question. It has been common of late for the railroads to supply good averages one day only to fall back the next day to a low point. This has been especially true of the Pennsylvania railroad, which furnished a 78 per cent supply yesterday to the Monongahela line. The Pennsylvania's average for last week was only 20 per cent as compared with an average of 80 per cent supplied by the Pittsburgh & Lake Erie railroad. Blast furnace interests report that while heavier shipments of coke are being received, they fall considerably under requirements and because of the irregularity of their arrival has placed some operations upon an almost day-to-day basis. It is understood that some equipment from the east has been diverted to the coke region in accordance with an order recently issued by the railroad administration. This is said to have proven helpful. For all practical purposes it is also said that the railroads have placed in operation the proposed change in car rating so that the supply is based on the number of ovens available for service instead of the number of ovens actually in blast. Tariffs calling for this change so far as known have not been approved by the interstate commerce commission, but it is not thought there will be any difficulty in having this done. There is practically no talk being heard at present regarding the pooling of coke shipments, but it is claimed that one railroad line and a representative of the fuel administration has not yet abandoned the plan as being impractical despite the claim of coke producers and consumers as well as the other railroad lines that it is not either feasible or desirable. Production in the Connellsville region for the week ending March 2, totaled 285,828 tons as compared with 264,849 tons during the preceding week according to the *Connellsville Courier.*

More Second Half Sales

Philadelphia, March 11.—Further sales of second half foundry coke, aggregating a large tonnage, have been made in this district during the past week. They were made entirely by a western Pennsylvania beehive maker. No blast furnace coke has been sold for some time. Despite the fact that shipments of coke are reported as improved, deliveries continue as slow as before and most eastern blast furnaces are hungry for fuel.

Pocahontas Fuel at $8

Cincinnati, March 11.—The fixing of a price of $8 per ton on Pocahontas coke was not generally known, as there was very little fuel in that district to be disposed of. The few carloads of foundry coke sold within the past week were on a basis of $8, ovens, but no transactions involving furnace coke have been made. Whether the same price is allowed on furnace coke is a matter yet to be determined. Slow shipments from all districts cause considerable complaint.

Shortage is Pinching

St. Louis, March 9.—The coke situation in this and the surrounding region continues lamentable. Best posted authorities say it has not eased up an iota and further there is nothing in sight which indicates that things are going to get any better in the near future. While plants in the district proper are not suffering to any great extent, they have to struggle for all the fuel they get and outside the zone cries for help come in daily. The car supply is extremely irregular, and receipts of foundry coke from eastern ovens are very disappointing. Owing to scarcity of the proper sort of equipment, the main producer here has had on several occasions to sell and load out foundry grade as domestic coke. Box car scarcity is growing.

Coke Production Unsteady

Birmingham, Ala., March 12.—While some improvement is to be noted in coke production in the south over last month, the output still is unsteady and pig iron production is being affected. In Alabama there is a better output at coke ovens than for some time. However, there is not as much coke throughout the south as there is need for it and two or more furnaces either are shut down or cannot be started because of this short supply. The coal mining situation is somewhat improved.

Scrap Shows Easier Trend

Uncertainty Over Commissions and Over Prices Beyond April 1 Continues Restraining Factor—Traffic Conditions Better

FOR COMPLETE SCRAP PRICES SEE PAGE 696

Pittsburgh, March 12.—Dullness in the market for iron and steel scrap continues and largely is due to the fact that nothing has been announced regarding the allowance of sales commissions. Consumers, it is understood, in most cases would be glad to pay a commission to dealers and brokers. In the absence of official interpretation by the scrap committee of the American Iron and Steel institute, however, they feel they have no right to pay any higher prices for scrap than those which have been fixed. Brokers and dealers also feel they have no right to accept a commission and say that unless they are able to do so, they can make no profit and therefore have no incentive to sell. Transactions involving limited lots are said to be under way between consumers and producers. No. 1 heavy melting steel, low phosphorus and No. 1 cast scrap are the grades which are in chief demand. With conditions in the traffic situation improving somewhat it is believed that once the market becomes active again there will be less difficulty than that experienced recently about making shipments.

Pennsy Distributes Tonnage

Philadelphia, March 11.—The Pennsylvania railroad has distributed about 10,000 tons of iron and steel scrap on the list it recently issued. Indications are that maximum prices were received, and that all of the scrap went to consumers direct. Sales reported here during the past week were made up of only moderate tonnages of cast scrap for foundry use. No heavy steel or wrought scrap figured. Although prices still are unchanged, the market generally reflects a weaker tone. Scrap is easier to get than at any time in months and shipments are being got through with less difficulty.

Rail Movement Better

Boston, March 11.—There has been no special change in scrap prices during the past week. The eastern Pennsylvania market for steel scrap is weak, with mills in that region taking less than they have recently in this territory, but the Pittsburgh market is strong both as regards demand and prices. The improvement in the railroad situation has resulted in a better movement of stock to buyers but it would still be exaggeration to say that the shipping situation is any better than fair. Wholesale dealers' paying prices per gross ton f.o.b. shipping points follow: Wrought, No. 1 yard, long, $30 to $31; horseshoes, $30 to $31; cotton ties, $22 to $23; stove plate $20 to $20.50; No. 1 machinery, $32 to $33; No. 2 machinery, $28 to $29; car axles, iron, $42 to $44; steel, $43 to $44; rerolling rails, $31 to $32; iron boiler plate, $34 to $35; bundled barrel hoops, $17.50 to $18; wrought iron pipe, new specifications, $28 to $29; steel rails, $26 to $27; No. 1 railroad steel, $26.50 to $27; heavy melting steel, $25.50 to $26.50; axle turnings, $21 to $21.50; machine shop turnings, $15 to $16; cast borings, $16 to $17; drop forge trimmings, $23 to $24; cast iron car wheels, mill price, $35 to $37.

Demand is Strong

Buffalo, March 12.—The market now is marked by a good, strong demand for nearly every class of scrap with a pronounced scarcity of many of the big selling grades. There is a marked shortage of cast scrap, railroad malleable and car wheels and hardly a less noticeable shrinkage of heavy low phos and heavy melting steel. Conditions in yards still justify the assertion that there is no such thing as yard stocks. But shipping conditions are easing a little more and on the whole the situation is improving. There is a good demand for turnings and large quantities of these are beginning to come onto the market, but it is as yet too soon to say whether the amount produced is going to be in excess of the demand or not.

Commission Still Puzzles

Cleveland, March 12.—Scrap iron and steel prices are subject to revision March 31 along with iron and steel products, though the latest schedule has been in effect only since Feb. 21. Some dealers regard it as certain that the present arrangement of f.o.b. works will be revamped because of the discrimination that accrues to some scrap consumers by reason of location and consequent freight rates. As to commissions, dealers more and more have come to the feeling that to charge them is illegal so long as the present announcement stands unamplified. Some dealers are said to be receiving a 3½ per cent commission; in other cases consumers, while willing to pay one, hold to the belief they dare not. The trade still feels that the subcommittee which announced the new prices and classifications should make some explanation on commissions. Open-hearth plants are buying all the steel they can; otherwise little trading is under way. No sales of cupola size cast at $35 are reported in this district, though foundries have offered to pay pig iron prices for it. Dealers could sell most grades of scrap below government maximums, but are holding back, feeling they will be able to get the full price. The Lake Erie & Western railroad is offering a small list of 14 cars.

Business Still in Rut

Cincinnati, March 11.—Business does not seem to be able to get out of the rut. The inaction of the past few weeks appears hard to overcome. Occasional spurts develop that indicate melters of scrap are still interested in the market, but they are very slow in making contracts for a future supply. The traffic situation has improved considerably but permits still are necessary to make shipments to some Pittsburgh territory consumers. Dealers and consumers are slow in getting together on prices and transactions are so few that no definite figures on some grades of scrap have been established.

Acute Shortage Expected

Chicago, March 12.—Indications are that a severe shortage of scrap is likely to come about in this district and signs are multiplying to bear out this expectation. At present rerolling rails are almost impossible to obtain and some mills have had operation much restricted from lack of raw material. Various factors conspire to keep the market in a state of uncertainty and to restrain trading. Lack of provision for commission on sales is hurting dealers and the possibility of quotations being changed on material delivered after April is limiting trading. Railroad offerings are somewhat freer at present, but still are far below usual volume. The Northern Pacific is offering 2600 tons, the Union Pacific 1635 tons, the Wabash 1100 tons, the Chicago, Milwaukee & St. Paul 820 tons, the Chicago Great Western 600 tons and the Chicago & Eastern Illinois 300 tons. Although at this season movement of scrap to consumers usually is at a high tide, dealers now are not able to obtain sufficient tonnage to fill their

requirements. Only a few cars are being shipped in some instances where consumers have contracts for thousands of tons.

Waiting Attitude in South

Birmingham, Ala., March 12.—The southern scrap market is in a waiting attitude, the consumers apparently being anxious to see what the government will do in the matter of revision of the pig iron schedule April 1. Stocks of old material in the south are in good shape and have been accumulating a little but the dealers do not manifest any concern. While quotations nominally are unchanged, consumers are not willing to pay this price by as much as $1 in some grades. Inquiries are being received from the north, but there have been no sales. Railroad car service is greatly improved.

Shortages Threaten Plants

St. Louis, March 11.—The inability to move scrap to the mills is causing considerable inconvenience and an acute shortage threatens several of the more important plants. Sellers have been under fire to expedite shipments, and in turn have waged war with the carriers, all, however, to little purpose. So far as can be gathered, dealers have taken kindly to the new prices and regulations, and little complaint is heard. Most of the big melters in the district are willing to purchase at the maximum government price for prompt delivery, but owing to the demoralized transportation, dealers cannot promise any shipment whatever. The labor flurry here has caused some uncertainty but it is believed this element will be adjusted shortly. Sentiment with the melters is bearish despite the temporary paucity of supplies. Railroad offerings are somewhat heavier, including Pennsylvania Lines-West, 1650 tons; Wabash, 1200 tons; Missouri, Kansas & Texas, 900 tons; Mobile & Ohio, 700 tons; Kansas City Southern, 650 tons; New York Central, 600 tons, and Pere Marquette, 200 tons.

Rush Work on Dayton Blast Furnaces

Every effort is being made by the Dayton Co., Dayton, Tenn., to push work at its mines, coke ovens and blast furnaces in order that its Dayton properties may again be placed in operation. The company states that some delay has been experienced on account of embargoes placed on raw material and at present it is impossible to say when the blast furnaces will be ready for the torch.

Sheet Bar Needs Unfilled

Consumers Find Great Difficulty in Getting Supplies and Mill Activities Suffer—Steelmakers Are Also Short

Pittsburgh, March 12.—Demand for sheet bars continues to be heavy and there are no offerings in the open market. Inquiries come from various sources, including sheet and tin plate makers and producers of sheet bars themselves would be buyers if it were possible to obtain tonnages. Producers are not able to make shipments in sufficient quantities to take care of specifications. Most of the tonnage moving now is understood to be going at the government price of $51, a gross ton, Pittsburgh, old contracts apparently having been filled. Inquiries for 4 x 4 billets are not numerous. There is a shortage of this material and no offerings are being made. Plate makers are seeking slabs, a number of inquiries having come from the east. The round tonnage of ingots which was recently offered has not been sold so far as known and this probably is due to the fact that it is high in carbon.

Strip Requirements Heavier

Pittsburgh, March 12.—Heavier requirements are being placed by the government for cold rolled strip steel. Domestic consumers are showing increased interest in the market but as yet are not taking sizable amounts. Their stocks appear to be almost exhausted.

Eastern Scarcity Continues

Philadelphia, March 11.—Users of semifinished steel in the east continue to have great difficulty in getting supplies. Eastern producers, as a result of their curtailed operations this winter, are unable to do any better than deliver part of the tonnage due on contracts. The only sales reported are occasional small tonnages from the Pittsburgh and middle western districts. These comprise almost exclusively rerolling billets. It is practically impossible to get slabs and forging billets.

Production is Taxed

Cleveland, March 12.—Consumers of semifinished steel, especially sheet bars, who are uncovered on considerable of their requirements continue to meet with little success in filling these needs. Makers are obliged to persistently decline to take orders because their production is taxed either through their own needs or through government business. Steelmakers in this district continue to be occupied largely with direct and indirect war tonnage and some of them are short of steel themselves. The scarcity in sheet bars is reflected by the fact that some plants which ordinarily produce their own supplies have been endeavoring to make trades with other steel producers whereby the latter would furnish sheet bars in return for other materials. An inquiry for 1800 tons of rerolling billets monthly for a northern Ohio maker of automobile parts still is pending.

Mills Forced Down

Youngstown, O., March 13.—Scarcity of sheet bars continues to pinch the mills in this district. One producer has been obliged to shut down several mills because he can't obtain bars of the required specifications. One sheetmaker recently had 400 tons of bars available for sheets which originally were intended for export. The buyer countermanded this order because he was unable to obtain an export license. Except for such cases few makers have any sheet bars in stock that are not covered by specifications.

Sheets Raised

From Cleveland Store to Include Full Freight—Shipments Better

Cleveland, March 12.—Prices of sheets have been increased by one jobber 0.035c per pound. The new price for No. 28 black is 6.385c; No. 28 galvanized, 7.635c and No. 10 blue annealed, 5.385c. These changes were made merely to conform with the government's recommendation made some time ago that jobbers add to their prices the carload freight rate from Pittsburgh. This jobber had made an initial change of only 10c.

Shipments Coming Through

Boston, March 11.—Conditions in the steel and iron jobbing trade are unchanged aside from the fact that dealers are not having quite so much trouble as recently in getting through their shipments from the mills. This is explained by the fact that the mills are running fuller and the traffic situation has been helped by the more favorable weather. The character of the local demand has not changed; structural materials move slowly.

Bar Orders More Liberal

Specifications Against Contracts Are Active—More Selling Being Done—Pleasure Auto Building Cut to 30 Per Cent

Chicago, March 12.—Specifications on existing contracts are being received in heavier volume than ever, all consumers with contracts apparently seeking to obtain everything possible from mills. Sales continue in good volume, practically everything being for government purposes with only occasional small lots for private users. Production and shipment are assuming more nearly normal conditions and the leading interest now has 24 out of its 29 blast furnace stacks active, which approaches close to full operation. Further conditions depend on fuel receipts and additional coke ovens being made active. Agricultural implement manufacturers have been covered as far as mills are able and probably will not suffer for supplies. Bar iron manufacturers are coming back into better operating condition now that coal is moving more freely. Inquiry and orders are coming in steadily, although in small tonnages and for prompt delivery. Some inquiry is being received from the south and the east, consumers apparently being unable to cover their requirements nearer home. Inasmuch as mills have lost much time recently, consumers are seeking delivery on tonnage bought some time ago. Considerable iron is required by wagon manufacturers for tires and orders of 300 tons and upward have been taken for this purpose. Hard steel bars are not in strong demand although manufacturers are placing some business. Reinforced concrete builders are also becoming more lively as the building season nears. On account of short supply of rerolling rails, mills are not anxious to sell beyond such material on hand. Shortage of rails is such that plant operation is spasmodic.

Car Shortage Checks Output

Pittsburgh, March 12.—Makers of steel bars report that shortage of cars again has curtailed production. Mills had been operating rather heavily and making good headway in catching up on deliveries. Demand is fair but it is believed it will become heavy in the near future when the implement trade begins to place requirements for next year. Heavy tonnages also will be required for farm tractors. The development of this machine is an extremely interesting subject and will have a far reaching effect on steel bar requirements. It is estimated that there are now approximately 50,000 farm tractors in the United States and that the number will be increased by 70,000 before the end of the year. Makers are expected to be in a position to take care of requirements before long and every effort will be made to supply the implement trade.

No Effects of Auto Cut

Cleveland, March 12.—Announcement that production of pleasure automobiles will be cut to 30 per cent of capacity during the coming fiscal year has produced no reflection as yet in the market for steel bars and other products in this district. Some weeks ago it was stated that the curtailment of this class of production would amount to about 50 per cent and steel makers have been prepared to furnish material on that basis. Some of the automobile builders have been specifying freely for steel but some of this is for airplane motor work. The demand for bars apart from government requirements continues more active. The George A. Fuller Co. is the low bidder on viaduct work in Kansas City requiring 1000 tons of reinforcing bars. Flood reclamation work at Columbus, O., requiring about 500 tons. The inquiry for 55,000,000 bolts for the engineers' depot is being revised.

Fair Demand for Hoops

Pittsburgh, March 12.—The market for hoops and bands remains unchanged. Fairly active demand exists for hoop and flat steel while the market for bands is dull.

Car Supply Better

Pittsburgh, March 12.—A larger supply of cars is at the disposal of nut, bolt and rivet makers and in consequence they have been able to increase their operations, which are devoted largely to government orders. No large requirements have been placed by it during the past week. Deliveries to domestic buyers depend upon the grade and quantity of material and range all of the way from two weeks to 90 days, the average being six to eight weeks. Prices for shipment after April 1 are made subject to government revision. Producers are succeeding in getting sufficient supplies of steel bars. They claim that the existing government prices afford such a narrow margin of profit that it is not believed they will be reduced.

Places Reinforcing Bars

New York, March 12.—The Turner Construction Co. has placed the 8500 tons of concrete bars for government buildings on which it recently asked prices. Of this amount 4500 tons for army and navy buildings at Washinton went to Bourne-Fuller Co. and the Concrete Steel Co., and 3700 tons for naval stores buildings in South Brooklyn to the Cambria Steel Co.

Shafting Buying Increases

Pittsburgh, March 12.—Increased purchases of cold rolled shafting by miscellaneous domestic consumers have developed. The bulk of buying still is being done either directly or indirectly for the government. Greater output has made it possible for producers to give better shipment to private consumers but most of the tonnage for them is for second quarter. Prompt sales are made at the fixed level of 17 off to list, Pittsburgh.

Buffalo Maker Sells

Philadelphia, March 11.—Demand for steel bars still continues active, and is considerably larger than the mills can accept. Makers are taking on tonnage only when practically forced to do so by regular customers. Only one mill, a Buffalo interest, has really made definite offers and it now has about all the orders it wants. Some hard bars, rerolled from shell discards, are being sold at 2.90c, Pittsburgh.

Export Inquiry

For Rails More Active—Few Cars Being Placed

New York, March 12.—Inquiry for rails for export has become quite active during the past couple of weeks and current inquiries involve many thousands of tons. In most cases, these inquiries call for 500 to 2500 tons, but some of them involve as much as 5000 tons. Among new inquiries is one from Java for 1500 tons of 20-pound rails, and most of the other inquiries come from various countries in South America, and involve 60 to 70-pound rails. This business cannot be quoted on by any of the mills, not only because of the export embargo, but because of the fact that they already are behind in deliveries on many hundreds of thousands of tons of rails for domestic roads. It is reported that 50,000 to 60,000 tons of rails of the old Hudson Bay railroad have been purchased by England and are to be torn up and sent

abroad for relaying on newly built lines.

Some miscellaneous inquiry is before the market at this time, principally for tank cars. The largest of these call for 250 for the United Securities Co., and 300 for Cio Anfaldo & Co. Other inquiries for tank cars include 100 for the Oil Gas & Lease Co., 30 for the Pure Oil Co., and a number for Fels & Co. The Paragon Refining Co. recently awarded 20 tank cars to the Pressed Steel Car Co.

Await Government Program

Chicago, March 12.—Buying of steel rails and rolling stock by railroads is practically at a standstill since the impression has gained ground that the government will buy or supervise the buying of these supplies. Some small lots of standard rails have been placed recently, supplementary to previous contracts. Considerable inquiry exists for track fastenings but most railroads have sufficient supply already covered on former contracts.

Small Spikes Are Bought

Pittsburgh, March 12.—Fair sized lots of small spikes are being booked but the demand which comes chiefly from jobbers, exceeds the supply. Some makers are out of the market. Demand for standard railroad spikes is also increasing and a number of small orders have been taken during the past week for prompt shipment. The market for light rails is rather brisk and makers are in a position to give good deliveries at the fixed price of 3c per pound, mill. The market for standard rails continues dull.

Stocks Growing

In Tin Plate Because Car Supply is Far Below Needs

Pittsburgh, March 12.—Despite the recent order of the railroad administration allotting a full supply of cars to tin plate mills, the amount of rolling stock available is far short of the requirements. Last week only 65 per cent of the promised allotment was furnished. Operations of all the mills are from 80 to 85 per cent of capacity. It is therefore obvious that stocks in warehouses are accumulating and unless relief is forthcoming soon in the way of more cars, the storage capacity will become exhausted and compel producers to curtail output. This would be particularly distressing in view of the urgent necessity of operating at capacity to meet government demands. There has been a large loss in production of tin plate and the situation is serious.

More Ship Tonnage Placed

Eastern Plate Mills Receive 50,000 Tons For Merchant Fleet—More Open Market Selling—Keenly Await Price Action

Philadelphia, March 11.—Orders totaling at least 5000 tons were allotted to eastern Pennsylvania mills by the government during the past week. The greater portion of this business was placed by the Emergency Fleet corporation. In addition, more tonnage is being accepted by the mills from ordinary domestic users. One eastern Pennsylvania maker sold some 5000 tons of tank plates for delivery in six to eight months, and a Buffalo mill has taken considerable tonnage of tank plates for delivery in the next few months. Eastern makers are waiting with great interest the action which will be taken by the government with respect to prices that are to prevail after April 1. All the eastern mills who buy their raw material in the form of pig iron or semi-finished steel have requested an advance from the prevailing price of 3.25c, Pittsburgh.

Want Higher Prices

Pittsburgh, March 12.—Considerable interest is being manifested as to what the government may do with regard to fixing prices on April 1 for plates. The small consumers are insisting that the present level of 3.25c, Pittsburgh, is not profitable and that a higher figure should be allowed by the government. There is much sympathy with this position and these producers and the trade generally appear to feel that the request for an increased price will be granted, although action of this kind is by no means certain. Production of plate mills is proceeding at a high rate. Some authorities have expressed the belief that because of the large capacity, plates can be produced faster than the shipyards and other consumers can use them, and that therefore it would be a good plan to divert a portion of the ingot tonnage temporarily to other lines of output whose necessity is immediately pressing. Car makers have about cleaned up all their orders and would be in a position to begin work on this large volume of rolling stock at once. No offerings of plates are being made in the open market. The vast bulk of the output is for the government.

Government Tonnage Heavy

Chicago, March 12.—Large tonnages of plates, principally for ship construction, continue to be distributed by the government and furnish a heavy aggregate now on mill books. Considerable tank work will be required for power manufacturing plants about to be erected, which will add to necessity for supplying plates for that purpose. It is believed that better operating conditions of mills will shortly bring deliveries to a point where consumers will have excess supply and where steel can be diverted to other purposes temporarily, thus balancing operations better than at present.

Pipe Delivery

Hampered By Embargoes—Costs Rise—Cast Product Listless

Pittsburgh, March 12.—Embargoes in the east are hampering shipments of iron and steel pipe, but tonnages are moving in other directions and operations are proceeding on a good basis. One plant in the Pittsburgh district is operating fully on its lap weld capacity. Demand for this class, both iron and steel, is heavy and mills report there is no difficulty in making sales. Some producers are out of the market. It is claimed that the cost of some mills to make pipe has increased 25 per cent since the government established prices, and because of this makers feel confident the government will not lower schedules but that it would be justified in increasing them. Effective March 7 the Youngstown Sheet & Tube Co. issued a new card on electrical conduit pipe reducing the price $8 a ton by increasing the discounts on the base sizes, ¾ to 3-inch, from 17 to 21 off on galvanized pipe and from 23 to 27 off on black pipe, Pittsburgh. This replaces the card of May 2, 1917.

Miscellaneous Orders Fair

New York, March 12.—Although there is a lack of large inquiries, a good volume of miscellaneous business continues to come out in the eastern cast iron pipe market. This demand principally is from private consumers, as has been the case for the past several weeks. Government buying at this time is relatively small. Included in business recently placed are several hundred tons of bell and spigot pipe for the government explosive plant at Charleston, W. Va. This work went to the United States Cast Iron Pipe & Foundry Co. Flange

pipe for the Charleston plant is to be purchased shortly. The market practically is void of inquiry from municipalities. Export buying also is dull.

Cast Pipe Demand Slack

Chicago, March 11.—Cities continue to keep out of the market for cast iron pipe and the present situation is duller than has been experienced for a long time. Bids were to be opened at Beresford, S. Dak., March 11, on 185 tons and at Niagara, Wis, March 14, on 142 tons. The United States Cast Iron Pipe & Foundry Co. is low bidder on 1500 tons at Akron, O., and 350 tons at Minneapolis.

Wants Many Hangar Sheets

Government's Requirements of Corrugated Material for France Placed at 50,000 Tons—Production Low—Government Places 2000 Tons

New York, March 12.—A tremendous tonnage of corrugated sheets will be required by the government in connection with the construction of 25 hangars in France, which have been recently up for action. It is estimated that 50,000 tons of No. 22 gage sheets will be needed for these purposes. The contract for a number of these hangars already has been closed and further awards are to be made in the near future.

Operate at Low Rate

Pittsburgh, March 12.—Sheet mills are being operated at a low rate of capacity again on account of the shortage of sheet bars, together with the unsatisfactory transportation situation. One large maker was able to produce at only 13 per cent of full output yesterday and the output today was not increased much. This is not indicative of general operations, the specific average of which has not been made known, but is significant as showing the conditions which mills are facing. Rough estimates have been made that operations of all mills represent approximately 50 per cent of capacity. The government continues to place large orders for sheets. Sales being made to domestic consumers cover comparatively small lots. Producers have allotted their sales for the first half as a general thing and free tonnages available are small. This gives further evidence that there will be an extreme shortage for domestic consumption.

Government Orders Placed

Youngstown, O., March 13.—Buyers of sheets in this district evidently are not expecting any change in prices in the near future for they are inquiring for all grades. The government continues to be an active buyer and this past week has come out for further tonnages. One valley mill has closed for about 2000 tons of governmental galvanized tonnage which will be used for buildings now under construction at various shipyards. Another producer has taken about 800 tons of galvanized sheets to be used for roofing and siding of ammunition buildings which the government is constructing in this country. The government has been a heavy buyer in this district for several months and 65 per cent of the production of one mill the past week was of this character. Export business has fallen off considerably. Producers attribute this to the failure of the buyer to obtain permits. Shipments for western export are being dispatched frequently, however, and six permits were issued this week which authorized one mill to ship fair-size tonnages of black and galvanized to consumers in Australia. One valley maker has several mills idle on account of his being unable to obtain sheet bars to meet specifications.

Export Demand Heavy

Chicago, March 12.—Inquiry for steel sheets of all gages and grades is the outstanding feature of the market in the west. This demand comes from South America, Central America, the Orient and to some extent from European countries. It includes both black and blue annealed and galvanized. Domestic consumers for the most part have tonnages still coming on previous contracts and are not inquiring heavily at present, as they realize the situation is such that present buying would not bring deliveries for a long period. It is believed that could deliveries be made promptly, domestic users would come into the market for heavy tonnages. It is estimated that independent sheet makers are now running their mills at 80 per cent of capacity with the leading interest at a somewhat lower rate. Practically all sheets which can be made and delivered during first half are under contract.

To house shipwrights, the government will commandeer all vacant living quarters in the neighborhood of Hog Island, near Philadelphia.

Ferro Tonnage

Is Closed by Pittsburgh Consumer—Spiegel Prices are Stronger

New York, March 12.—A Pittsburgh district consumer has closed for 5000 to 6000 tons of ferromanganese for the second and third quarters with several producers at approximately $250, delivered. This is the largest purchase of this metal in several months. Approximately 1500 tons were placed by other consumers and about 200 tons of English metal were sold for forward delivery to a New Yorks state consumer.

Spiegeleisen is scarce for delivery prior to July 1 and it is doubtful whether any more first half tonnage is available at less than $65, furnace. It is likely that $70 would have to be paid. Sellers recently doing $3 per unit are now obtaining $3.50. Several hundred tons of 30 to 40 per cent have been sold at the latter price. New inquiries call for several thousand tons. The Algoma Steel Corp. has decided to postpone the placing of 3000 tons for second and third quarters.

The contract market on 50 per cent ferrosilicon now stands at $155, delivered. Two important makers quoted this price during the week. Spot material is scarce and is moving up. Prices range from $180 to $185, delivered.

Ferrochrome Strong

Considerable diversity in prices characterizes the ferrochrome market. Prices quoted on contracts by the leading producer for some time have ranged from 31 to 34 cents, furnace, for 60 to 70 per cent ferrochrome containing 4 to 6 per cent carbon. This interest has been restricting spot sales to urgent additional requirements of customers under contract. Prices in the outside market, however, are much higher and nothing less than 40 cents per pound, furnace, can be done. On attractive lots for the next 30 to 60 days, 40 to 42 cents is being named in some cases. Ordinary spot lots are bringing from 45 to 48 cents. Production of ferrochrome may be increased slightly in the next few months as efforts now are being made to increase the importation of chrome ore. Ferrotungsten is quoted at $2.20 to $2.25 per pound at the furnace for 70 per cent metal. Demand has quieted down somewhat.

Wait For Price Action

Pittsburgh, March 12.—Consumers of 50 per cent ferrosilicon are putting out inquiries for second quarter and last half in increasing number.

Only small tonnages are being taken. It is apparent that buying is checked because of the price-fixing program on April 1, and consumers seem to think this may affect and soften the ferroalloy market. Makers say they do not see any likelihood of such products as 50 per cent ferrosilicon and ferromanganese being brought under price control although it is reliably reported there is a movement under way to have this done. A price of $150, delivered, is quoted by one seller for last half 50 per cent ferrosilicon, while the prompt market continues at $175 to $180. A price of $190 has been asked. A few small inquiries for ferromanganese are out. The market is quotable at $250, delivered, for prompt shipment. It is reported that a price of $245, delivered, has been quoted by an electric furnace interest in the Far West on an inquiry from a Pittsburgh consumer for a round tonnage. Approximately 1000 tons of prompt 20 per cent spiegeleisen were sold by a Pittsburgh middleman to an Ohio consumer at $62, furnace. The war industries board has issued a form which requires buyers of ferromanganese to pledge themselves, that they will consume and not divert tonnages to other sources.

Ferro Price Shaded

Cleveland, March 12.—A local steelmaker has bought 600 tons of ferromanganese for delivery over the remainder of the year. A price of $250 delivered is understood to have been considerably shaded.

Chicago Ferro Steady

Chicago, March 12.—Considerable inquiry is being entertained by the western maker of ferromanganese but selling is restricted in view of uncertain ore conditions. The quotation remains strong at $250 per ton at the furnace.

Spring Trade

Opening Briskly in Wire Products—50,000 Kegs of Nails Asked

Cleveland, March 12.—Open weather conditions have considerably stimulated the demand from jobbers for fencing, wire nails, barbed wire and similar products. This is a result of the heavy demands which the dealers have been putting upon the jobbers during the past week or two. Some of the jobbers had been fairly swamped because the dealers have had no stocks and the opening of spring purchases by consumers had sent them scurrying for supplies. There is an active market for small spikes, especially boat spikes, and deliveries have dropped back for some makers to 14 and 16 weeks.

Seek Large Nail Lots

Pittsburgh, March 12.—Bids are being asked by the bureau of supplies and accounts, navy department, to furnish approximately 50,000 kegs of nails of various sizes for last half delivery to navy yards. Makers are asked to fix delivered prices but they would prefer to name mill prices because of the uncertainty as to what change may be made in freight rates before deliveries are begun.

Shape Demand More Active

Eastern Mills Enter Better Tonnage From Miscellaneous Sources—More Tonnage For Powder Plants is Placed

Philadelphia, March 11.—Demand for structural steel, while not really active, has improved markedly. Orders for at least 5000 tons of plain shapes have been placed during the past week. The largest order involved 1500 tons for a car builder. At least two 1000-ton lots were closed and a great many small tonnages. Most of this business was placed by jobbers and considerable came from fabricators. A large part of the material ordered is wanted in connection with government work. The Belmont Iron Works has received a contract for 20 of the 2500 airplane shelters on which bids recently were taken for erection in France. It is understood the letting of the remainder is held up temporarily.

Government is Large Buyer

Pittsburgh, March 12.—Large tonnages are involved in orders being placed by the government with fabricators in this district. The bulk of shop operations is devoted to its requirements. No diffculty is being experienced in getting steel tonnages where they are to apply on government orders but in the case of domestic orders, material cannot be had readily.

Ship Material Leads

Chicago, March 12.—Tonnages of structural material to be furnished fabricators preparing parts for ships continue to be placed by the government and furnish the largest proportion of new business. This work is keeping most shops busy and piling up somewhat on their ability to deliver. Powder manufacturing plants to be erected by the government are bringing some tonnage into the market and contracts have been let for two of these units, to be located at Nashville and Chattanooga, Tenn. The steel has been divided among fabricators but preference has not been given and the latter have been seeking to place the plain material. The total amount of steel required for all these plants has been placed at 20,000 tons. The Missouri Pacific has placed 497 tons for a bridge near Watson, Ark., with the American Bridge Co., contingent on obtaining government consent to build the bridge.

Powder Plant Steel Placed

New York, March 12.—Aside from a few contracts bearing on war work, little is appearing in this market in the way of new tonnages. Commercial demand continues at exceedingly low ebb and despite the near approach of spring, little is in prospect. It is believed that anything like a sizable tonnage at this time would bring forth the keenest competition among the majority of fabricators. A recent contract to be awarded this market is that involving about 1250 tons for the new government explosive plant to be erected by the Atlas Powder Co., near Perryville, Md. A similar tonnage for this work was also awarded to the McClintic-Marshall Co. Several sizable tonnages for the railroads still are pending.

CONTRACTS AWARDED

Atlas explosive plant, Perryville, Md., 2500 tons, to McClintic-Marshall and Levering & Garrigues.

Machine and erecting shops, blacksmith shop and car repair shops for Lake Superior & Ishpeming Railway Co. at Marquette, Mich., 268 tons to Lackawanna Steel Co.

Bridge for Missouri Pacific railroad near Watson, Ark., 497 tons, to American Bridge Co. Contract contingent on government consent for project to be carried out.

Powder plant for government 1100 tons a partial contract awarded to the Central States Steel Co. Much larger tonnage still to be placed.

Extensions to the plant of the Campbell Soup Co., Camden, N. J., 150 tons, to an independent shop.

Rebuilding of Monticello hotel, Norfolk, Va., 300 tons to Richmond Structural Steel Company.

CONTRACTS PENDING

Building for Edge Moor Iron Co., Edge Moor, N. J., 200 tons, bids being taken.

Marine Railway, Boston and Charleston, 500 tons, bids to be received by navy.

Secretary of Labor Wilson states that never before in his term of office have strikes been so few.

Foundrymen Fighting For Pig Iron

Organizing Protest Against Requisition by Government Action of Any Present Foundry Furnaces For Steelmaking Grades—Survey of Industry Being Made by American Foundrymen's Association to Demonstrate Its War Service

ORGANIZED cognizance of the threatened effects upon their business of the growing shortage of supplies of pig iron is being taken by foundry consumers. This movement has been brought to a head by the recent efforts of steel works in Pittsburgh and Ohio territory to induce the government to have changed over to the making of basic in their behalf, certain valley blast furnace capacity now on foundry iron. As recently stated in THE IRON TRADE REVIEW, these steelmaking interests have an uncovered requirement of at least 100,000 tons of basic for the last half of the year which they have been unable to cover in the open market because of the sold-up condition of the furnaces.

The effort to preserve a sufficient production of foundry and malleable grades of iron for the casting industry is being carried on by the official organization of the American Foundrymen's association. As a preliminary step, data are being collected to fix the exact part which gray iron and malleable plants now are performing in the production of essential war work. This information is being solicited in the form of a questionnaire which has been sent to all members of the association. Such replies as already have been received tend to show that approximately 50 per cent of the gray iron and malleable capacity of the country is engaged in some form of direct or indirect war business. The estimate of an engagement of 50 per cent capacity on war work is regarded as conservative. Recently a prominent middle western pig iron producer conducted an independent canvass of the list of consumers to which he was shipping foundry and malleable iron in order to determine to what extent this metal was going to government purposes. The replies elicited by this investigation indicated that 80 per cent of the iron being delivered by the several furnaces represented by the interest was being utilized for the manufacture of some direct or indirect war requirements.

Aim to Preserve Production

The survey of the foundry industry now being made by the American Foundrymen's association will be utilized in a vigorous attempt to preserve for this class of consumers a sufficient production of those grades of iron necessary to maintain their operations, especially along essential lines. The data thus compiled will be laid before the proper authorities at Washington in order that all aspects of the present situation may be understood and that no action shall be ordered which permanently may curtail the tonnage available for these shops. It is pointed out that already under the urgent pressure from steel works producing war tonnage and in some cases through the acts of those at Washington directing iron and steel distribution, there has been a switch to steelmaking grades of several regular makers of foundry and malleable iron. This has taken much tonnage out of the market for buyers of the latter class and has increased their difficulties in providing their requirements by forcing them to build up new sources of supply which they are scarcely able to do under present conditions.

These difficulties of providing supplies pertain mainly to forward requirements, especially after July 1. Then it is indicated the present shortened general production of pig iron and the increased demands promise to bring about a serious famine in this indispensable raw material. If such a development takes place the foundry industry because of the lessened number of blast furnaces operating in its behalf will be put in serious straits, it is set forth. The organized effort now being made to protect the interests of this industry is aimed to insure that this stringency which it is appreciated probably will have to be faced, shall not be aggravated by the subtraction of further foundry iron capacity from the present line-up of furnace operations.

The shifting of blast furnaces from foundry to basic iron would modify the demand for Lake Superior iron ore. Much of the ore for 1918 delivery has already been contracted for. These contracts were drawn in line with earlier market conditions and insure the delivery of tonnages of ore suitable for meeting the normal demand for both basic and foundry irons. Ore interests have not considered the situation brought out by the suggestion for reducing foundry iron production. Much of the ore now contracted for, running up to 0.35 per cent phosphorus, would normally not be used for producing basic iron, but in an emergency would be suitable for such purpose.

Wages Reduced

In Sheets and Tin Plate Because of Government Prices

As a result of the bi-monthly wage settlement of the Amalgamated Association of Iron, Steel and Tin Workers, effective for the two months following March 1, it is expected that all nonunion sheet and tin plate mill operatives in the country will have their wages reduced. Nonunion operators ordinarily follow the union wage scale closely. It develops at the meeting held at Youngstown this week, that the average sales price on 26, 27 and 28 gage sheet, shipments for the January-February period as $5.35 as against $5.50 two months earlier. On tin plate, the average price was $8.40 per base box as against $8.60 in November and December. This reflects the effect of the government price of $5 for 28 gage black sheets and $7.75 per base box, tin plate and unless these are advanced effective from March 31, wages will still further recede.

At the last bar iron settlement, the price was $3.10, which means a boiling rate of $15.05. Should bar iron go to $3.50 the government level per 100 pounds, $17.05 would be paid puddlers or for the single operation of boiling, one-fourth the price of the finished product, $70 per ton.

Receives Advancement

George L. Danforth has been made assistant general superintendent of the Illinois Steel Co., South Chicago, succeeding Herman A. Brassert, resigned. Mr. Danforth long has been identified with the blast furnace department of the South Chicago works.

To Build Foundry

The Four Wheel Drive Auto Co., Clintonville, Wis., contemplates the erection of a steel foundry to be equipped with an electric furnace. G. H. Billings is purchasing agent.

New Steel Prices to be Fixed Soon

Steel Committee of American Iron and Steel Institute Will Meet War Industries Board March 20—Additional Prices Suggested—Operators Submit Ore Mining Costs

ON Wednesday, March 20, the general iron and steel products committee of the American Iron and Steel institute will take up with the war industries board at Washington the question of prices on iron and steel commodities after April 1.

The meeting is engaging the attention of the entire iron and steel industry. Government-fixed prices have now been in effect long enough to permit a thorough test of the whole price fabric under which the iron and steel industry is voluntarily operating. As a result, a number of claims have been brought before the institute committee by representatives of various lines of manufacture. These claims range from recommendations for changes in the prices of commodities on which the President set the quotations, to a request for fixed prices on commodities used in turning out iron and steel products. This latter class is understood to include such commodities as refractories, etc.

Want Price Fixing Extended

The institute committee has been petitioned to fix prices on all products entering into the manufacture of steel, as a means of stabilizing the price for steel products. The raw materials in steel manufacture have been placed under government price control, but a number of the accessories are obtainable only under open market conditions. This fact has been called to the attention of the institute committee by some steel manufacturers, who urge the inconsistency of setting prices for finished products without controlling quotations on all materials entering into their manufacture.

Many steel manufacturers attended the recent New York meeting held at the suggestion of the steel committee to secure information necessary in formulating price recommendations for the attention of the war industries board. One of the most interesting sets of cost figures which, it is understood, was brought to the attention of the steel committee related to iron ore prices. The 1917 prices on iron ore, which were set in November, 1916, have been continued in effect up until this time. The ore trade, accustomed to a 12-month basis of doing business, has been hampered in preparing for the 1918 season owing to the uncertainty regarding this year's prices.

The cost figures submitted by the independent ore interests show that for the underground mines in the Lake Superior district the margin between costs and sales price is sharply narrowed or disappears altogether if 1917 quotations are applied to 1918 costs of mining. Mesabi range underground mining costs follow:

Average Cost to Produce a Ton of Ore in October and November, 1917, of Mesabi Range Underground Mines, Showing the Profit or Loss of Operation.

Total tonnage shipped by independents in 1917 (Est.) 5,000,000

1917 tonnage of mines reporting costs:

Bessemer	1,372,008
Non Bessemer	3,453,276
Total	4,825,284

		Bess.	Non-bess.	Total
(1)	Labor	$1.184	$1.175	....
(a)	Powder	.094	.089	....
(b)	Fuel	.129	.175	....
(c)	Other supplies	.214	.219	....
(2)	Total supplies	.437	.482	....
(3)	Oth. mining costs	.140	.133	....
(4)	Depletion	.210	.276	....
(5)	Depreciation	.111	.048	....
(6)	Exp. of idle mines	.009	.007	....
(7)	Admin. exp.	.106	.085	....
(8)	Royalties earned	.661	.492	....
(9)	Total cost at mines	2.812	2.678	....
(10)	Rail and lake freight	1.819	1.760	....
(11)	Insur. and analysis	.021	.018	....
(12)	Int. & carry'g chgs.	.106	.102	....
	Total cost at Lake Erie	4.761	4.558	....
	Add 10c for hazards in mining and unsuccessful development	.100	.100	....
	Total	4.861	4.658	....
	Shrinkage in trans. (1 per cent B/L)	.049	.047	....
	Grand total 1917 cost at Lake Erie	4.910	4.705	$4.763
	Estd. increased cost in 1918—15 per cent of items 1, 2, 3 and 7	.280	.281	.281
	Total estimated cost at Lake Erie in 1918	5.190	4.986	5.044
	Actual aver. price recvd. at Lake Erie in 1917	5.630	4.650	4.933
	Net profit in 1917 with 1917 ore price	.720	.05*	.170
	Net estd. profit in 1918 with 1917 ore price	.440	.33*	.11*

*Loss.

For the Menominee range underground mines whose operators submitted cost figures, the 1917 cost of iron ore is placed at $4.73 a ton, against an average price received of $4.76 a ton, a net profit of 3 cents. The estimated increase in cost this year is placed at 34 cents, so that if 1917 prices are reaffirmed the net loss this year would be 31 cents a ton.

On Marquette range underground mines, the net profit in 1917 is estimated at 41 cents per ton, but the net profit for 1918 on the basis of 1917 ore prices is placed at only 11 cents per ton. On Gogebic range underground mines, the net profit of mining ore in 1917 is placed at 4 cents per ton, while on the basis of 1917 ore prices operations in 1918 would result in a net loss of 39 cents per ton. Detailed figures for Menominee range underground mines follow:

Average Cost in October and November, 1917, of Menominee Range Underground Mines Showing the Profit or Loss of Operation.

Total tonnage shipped by independents in 1917 (Est.)	5,000,000
1917 tonnage of mines reporting costs	3,332,749
(1) Labor	$1.244
(a) Powder	.239
(b) Fuel	.212
(c) Other supplies	.252
(2) Total supplies	.703
(3) Other mining costs	.178
(4) Depletion	.382
(5) Depreciation	.087
(6) Expense of idle mines	....
(7) Administrative expense	.127
(8) Royalties earned	.335
(9) Total cost at mines	3.054
(10) Rail and lake freight	1.418
(11) Insurance and analysis	.014
(12) Interest and carrying charges	.092
Total cost at Lake Erie (Average cost for year to Dec. 1, 1917, $4.36)	4.585
Add 10c for hazards in mining and unsuccessful development	.100
Total	4.685
Shrinkage in transit (1 per cent B/L)	.047
Grand total 1917 cost at Lake Erie	4.732
Estimated increased cost in 1918—15 per cent of items 1, 2, 3 and 7	.338
Total estimated cost at Lake Erie in 1918	5.070
Actual average price received at Lake Erie in 1917	4.760
Net profit in 1917 with 1917 ore price	.030
Net estimated loss in 1918 with 1917 ore price	.310

The big open pit properties, where mining costs are materially lower, show larger profits. The average cost of ore from open pits of the Mesabi range independent operators, laid down at Lake Erie ports in 1917, was set at $3.83¼ per ton, while the average price received was $4.79, a net profit of 96 cents per ton. In 1918, with last year's ore prices in effect, this profit would be reduced to 85 cents per ton.

Good Record

Made by Operations in Youngstown and Greater Pittsburgh Districts

Youngstown, O., March 13.—Operating conditions in this and the Greater Pittsburgh districts are better than they have been for many weeks. Coke ovens and open hearths are operating at 91 per cent capacity, blast furnaces at 92 per cent and bessemer plants at 81 per cent. All but five of the blast furnaces in this district are in operation.

In the Mahoning valley district alone there are 51,000 tons of steel piled in the yards of the various producers waiting shipment. Of this amount 30,000 tons were stocked on account of embargoes and 21,000 tons because of car shortage. A shortage of box cars has become prevalent in this district and is causing much inconvenience among the tin plate manufacturers. Recently the government requested that all western shipments be made in box cars so that an ample supply of these cars would be available later for grain shipments east. Material for eastern points is shipped when the buyer obtains a permit from the government.

Operations Increase

New York, March 12. (By wire.)—Chairman Gary has announced that the Steel corporation blast furnace output now is about 83 per cent, ingot production 87 per cent and structural mills 90 per cent. These percentages show increases of 5 to 10 per cent over a week ago. Ship plate production, Judge Gary said, is 100 per cent. The plate mills right along have been worked as near capacity as possible owing to government needs.

Steel Institute

Formed in Canada as Section of Mining Engineers Organization

Toronto, March 11.—Arrangements for the organization of an iron and steel section of the Canadian Mining institute were effected at the annual convention held at Montreal March 6 to 8. This matter had long been under discussion. Dr. Alfred Stansfield, metallurgical expert of McGill University, presided at a meeting attended by a number of members of the mining institute connected with the iron and steel industry when the new movement was launched. There was some expression for a separate organization. The resolution as finally adopted provided that the new society be formed as an iron and steel section under the auspices of the Canadian Mining institute but that it could be changed to an independent organization should this be deemed advisable at any time.

An organization committee, including leading iron and steel men of Canada is as follows: Robert Hobson, J. G. Morrow, F. A. Sherman and W. M. Curry, of Hamilton; Col. Thomas Cantley, Mark Workman, W. C. Franz, Dr. Alfred Stansfield, W. J. Jannsen, H. H. Jacquays, J. A. Irwin, C. F. Bristol, Esmond Peck, G. H. Duggan and P. L. Miller, of Montreal; F. H. Macdougal, Sydney, N. S.; F. Crockard, New Glasgow, N. S.; J. J. Hartley, Kingston; George W. Watts and William Ingalls, Toronto; Col. David Carnegie, Ottawa; Capt. D. Kyle, Sault Ste. Marie; M. Deakins, Winnipeg; W. F. Robertson, Vancouver, and George McKenzie.

New Officers For Valley Mould & Iron Co.

At the annual meeting of the stockholders and directors of the Valley Mold & Iron Corp., Sharpsville, Pa., held in New York on Tuesday, March 12, George H. Boyd resigned as president and was elected chairman of the board. John E. Perry was elected president. Mr. Perry previously was president of the Wharton Steel Co., Wharton, N. J., and previously was for a number of years assistant to the president of the Republic Iron & Steel Co. Floyd K. Smith resigned as vice president of the Valley Mold company.

Since the Fore River yards of the Bethlehem Shipbuilding Corp. increased the working force to 12,000, more men are employed than ever before.

The Non-Ferrous Metals

Copper Lead Spelter Tin

New York, March 12.—Although the war industries board announced nearly a week ago that a price on aluminum had been fixed at 32c for lots of 50 tons and over of ingot of a grade 98 to 99 per cent, the trade still is awaiting details of the new policy which will enable it to proceed at the new level. The price is subject to revision June 1. Nothing was said in the statement with regard to sales of less than 50-ton lots, nor of the differential which should exist between virgin and remelted grades. It was merely said that the differentials now in force for the sundry grades, quantities and shapes, shall continue in force under the new contracts. At present some sellers of No. 1 remelted aluminum, 98 to 99 per cent are quoting 38c on less than carload lots. Sales of five and 10-ton lots of virgin have been made by outside sellers at 40c. Sheets in the outside market continue on the old base of 60c to 65c, although the new base, to be in line with 32c for ingots should be about 40c. Consumers are not buying except where necessity forces them into the market for immediate requirements. The aluminum scrap market sagged heavily when the announcement was first made, but now has recovered, somewhat, dealers being willing to buy old cast aluminum today at 21.50c; old sheet aluminum at 21.50c; and new aluminum sheet and clippings at 27.50c. Number 12 alloy has been offered by makers at 27c and it is believed this price might be shaded.

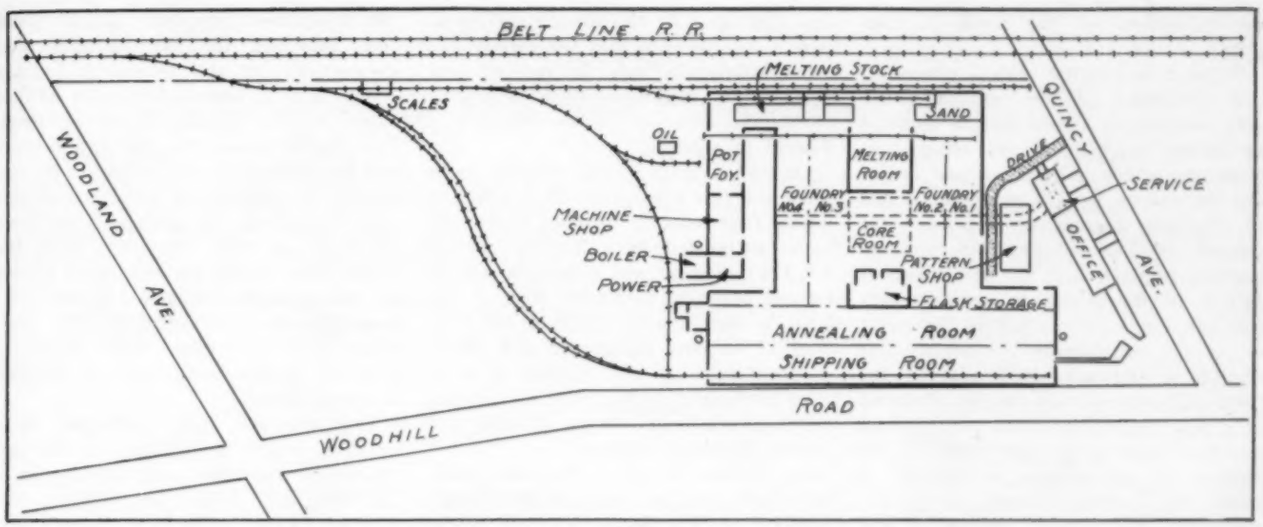
The tin market continues agitated. Practically no spot Straits or Banca is obtainable. The limited supply of 99 per cent tin, including Chinese No. 1, A. S. & R. and Lamb & Flagg, is quoted at around 85c to 86c for prompt shipment from New York. An active inquiry was in the market last week from miscellaneous sources, including makers of white metals, electrical manufacturers, etc. A good buying of Banca and Chinese tin for March shipment from the Far East, was done. Since many consumers of Straits tin are turning to Banca, and many former users of Banca are buying Chinese, the price spread between Chinese and Banca has been reduced considerably. Formerly the differential was about 6c to 7c, whereas now it is only about 1c to 2c. Chinese for March shipment from Hong Kong is quoted 74.50c to 75c; Banca for March shipment from Batavia is quoted 76.50c to 77c. It takes about three months for tin to arrive at New York after date of shipment. The government still is holding rather large supplies of Straits and Banca tin in this market, part of which is being released from time to time to manufacturers engaged in war work, the price being about 64c.

The copper market is devoid of interest. The supply of copper seems ample, with distribution going forward at 23.50c for carloads and 24.67½c for less than carloads.

The growing tendency toward higher prices in the lead market last week was checked by the entrance of one or two of the largest independent lead producers into the market. At present lead is available in the outside market at 7.25c, New York, for prompt, March and April shipment, the price which was quoted by the American Smelting & Refining Co. Inquiry is comprised largely of scattered carloads.

The spelter market remains lifeless, with an easier tendency still apparent in prime western. Offers of prime western at 7.65c, St. Louis, have failed to attract buyers and it is now said might be bought at 7.50c, St. Louis. The market may be quoted about 7.55c to 7.65c, St. Louis, for prompt, March and April shipment. In the east, spot spelter is available at about 8.25c, New York. Some business in sheet zinc now is being done on the base of 15c, f. o. b. mill. On high grade spelter, 12c, the new fixed price, prevails while on intermediate, sales at 10.50c to 11c, St. Louis, are reported.

The antimony market still is lagging. Chinese and Japanese brands have been offered at 13.25c, duty paid, without buyers.



General Layout of New Foundry of National Malleable Castings Co., Cleveland

Malleable Plant Nears Completion

Huge Foundry of National Malleable Castings Co., Cleveland, Rapidly Taking Shape—Will Be Exponent of Newest Features of Foundry Practice —Electric Furnaces to Be Employed

WHAT will probably be one of the largest foundries in the country is the huge new works of the National Malleable Castings Co., now rapidly nearing completion on a site adjoining the Belt Line railroad in the southeastern part of Cleveland. This plant, as a unit, is the result of years of planning and study, beginning virtually with the initial development of a new process for making castings. The preparation of the plans and the designing of the ingenious system which will characterize the operation of the new Cleveland plant have in fact been synchronous with the development of the triplex process, patented by W. G. Kranz, vice president, National Malleable Castings Co., Cleveland, on Dec. 5, 1916. The completed plant will stand out in the foundry industry as a radical departure from anything ever before attempted, for it represents the first attempt, other than experiment, to apply the electric furnace to the malleable iron foundry on a practical commercial basis.

Arrangement of Buildings

The buildings of the plant, upon which work has been progressing for almost an entire year, are located in a group slightly over 10 acres in area. They include the pattern shop, main foundry, service department, machine and carpenter shop and the boiler and power house buildings. The erection of the office buildings will be undertaken at a later date.

The main foundry building in which all of the apparatus for making castings by the Kranz process is contained, is an irregularly shaped structure approximately 575 x 725 feet. The building is of steel frame construction, the outer walls being of brick, while the roof is of the Aiken type, covered with cement slabs.

The structure is divided into bays or aisles in which the various departments are located. The accompanying plan reproduced from the February issue of the *Naco News* shows the general layout of the plant. On the side adjoining the Belt Line railroad is the storage department, 75 x 575 feet. It is provided with a series of reinforced concrete bins for storing sand, pig iron, melting stocks, coke, limestone and other necessary materials. Fifteen freight cars can be accommodated in this bay at one time.

The melting department adjoins the storage department at about the middle of the structure. It is easily the most interesting feature of the entire plant to the foundryman. All the equipment necessary to the proper working of the triplex process is located at this point. It includes two cupolas, two 20-ton specially constructed Heroult electric furnaces and two bessemer converters. Owing to the special nature of the product, however, only 15 tons of metal will be treated in the electric furnace each heat, despite the fact that they are 20-ton units. The melting capacity will be approximately 300 tons of metal per day, and the ladles of molten metal, holding from six to seven tons, will be transferred to the molding floors by means of electrically driven ladle cars.

Mr. Kranz's invention, described in his patent paper, is essentially as follows:

"My invention relates to the treatment of iron intended to be made into castings; and is designed to overcome the difficulties resulting from the presence of relatively high carbon and also in some cases of relatively high manganese and silicon, but particularly of carbon, in the iron.

Method of Melting

"In carrying out my invention, pig iron or scrap, or both, high in carbon, and which may contain appreciable percentages of manganese and silicon, are melted in any suitable furnace, such as a cupola, open-hearth, or air furnace. A portion of the melted charge depending on the amount of carbon and other impurities to be removed is then tapped out of the furnace and transferred to a bessemer converter, in which the carbon, manganese and silicon are wholly or partially blown out. The treated metal, and the remainder of the charge direct from the furnace, are then poured into a ladle or other container with the result that the percentage of carbon (as well as the percentage of the manganese and silicon) in the complete charge is reduced to within desired limits, and may then be cast. If a further refinement is desired, the charge may be transferred to an electric or other suitable refining furnace, in which

the refinement of the metal is completed.

"I have found that with a charge of iron containing 3.25 per cent of carbon very satisfactory results can be obtained by taking one-fifth of the charge, introducing it into a bessemer and reducing the carbon to 0.50 per cent or less by treatment therein, so that when the treated metal is mingled with the remainder of the charge the percentage of carbon in the whole is approximately 2.70 per cent. After further treatment in an electric furnace the metal thus refined is extremely well adapted for malleable castings, and can be produced at a very much lower cost and in much less time than is the case when the reduction of the carbon is effected in either the melting furnace or in the electric furnace. If it is desired to produce gray iron castings, suitable additions such as manganese or silicon may be made in the vessel to which it has been transferred, and the charge may then be cast.

"The advantages of my invention will be apparent to those skilled in the making of iron castings, since the troubles arising from high percentages of carbon and in some instances from high percentages of manganese and silicon, are practically eliminated, and iron containing excesses of such material is rendered commercially available for malleableizing and other purposes at a low cost and with a considerable saving in the time required for its conversion into castings. By the use of my invention it will be seen that the carbon and other substances may be reduced and equalized in any proportions depending on the character of the iron which it is desired to produce.

On either side of the melting room there are two aisles each 75 x 375 feet. These four bays or molding floors will be known as foundries, Nos. 1, 2, 3 and 4. The basement and coreroom will be located between foundries Nos. 2 and 3, in a floor space of 125 x 175 feet. East of the core department and almost in the center of the building is a 4-story structure to be used for storing molding machines, flasks, boards and various foundry supplies.

At the eastern end of the four molding floors and at right angles thereto is the annealing department, 100 x 725 feet. For the present 12 annealing furnaces of unusually large size will be utilized. They will be equipped to burn powdered coal.

The shipping and finishing aisle, directly east of the annealing department, has a floor space 75 x 725 feet. It lies parallel to Woodhill road. The railroad tracks inside this department will take care of from 18 to 20 cars at one time.

The boiler and power house 55 x 125 feet, is a steel and brick structure located at the southern end of the plant. The boiler room will contain three 350-horsepower water-tube boilers equipped with modern stokers. These boilers will be used for heating purposes only. In this department complete facilities have been provided for the handling and storage of coal and ashes. A heating system with a forced circulation of hot water is being installed in all buildings. The electric power for the entire plant will be obtained from an outside source, and in the installation of electrical circuits throughout the plant all have been placed in conduits. The runs from the power room to the various points of use are all underground, and for this purpose alone over six miles of fiber conduits have been used, while about 12 miles of metal conduits will be installed above ground.

The machine and carpenter shop building which is of steel, brick and reinforced concrete construction, 75 x 120 feet, two stories, lies between and adjoins the annealing pot foundry and the power house. The first floor of this building will be used for the machine shop and the second floor for the carpenter shop.

The service building, a 3-story brick structure 50 x 90 feet, faces Quincy avenue at the north end of the plant. The workmen enter the plant from this building through underground tunnels which lead from the time clock lobby on the first floor to all departments. This building is designed primarily to be of service to the employes and contains the dispensary, locker rooms and shower baths, beside several large club rooms. Attractive quarters will be placed at the disposal of the workmen.

Corrosion Tests of Steel Alloys

IN A GENERAL way it may be stated that the following are the types of corrosion usually met with: Corrosion from ordinary atmospheric effects; corrosion from special atmospheric conditions—for example, in manufacturing centers, where the air is less pure; corrosion in special media such as gases, acids, or other liquids; corrosion by heating effects. This is usually termed oxidation, but it is, of course, more or less corrosion. Losses by rust, oxidation, and even erosion may all be considered part of the same genus "corrosion," that is, the results obtained from each of the types named are governed by the same or, at any rate, similar laws.

Investigation Encouraged

Studies of the alloys of iron by which corrosion can be governed or corrected and conclusions arrived at as to the kind of alloys, whether of iron or other metals, which best resist this deterioration are to be encouraged, and should be of great service to mankind. Any of us who can, therefore, add to the life of iron and steel in its forms and uses will be a public benefactor, and although the present supplies of iron in the world are of enormous variety and extent, a time will eventually come when probably the iron of the world will have to be more carefully husbanded than now, when evidence of much waste of the metal is rife on every hand.

The old proverb that "He who owns the iron of the world will rule the world" is being exemplified in the terrible struggle now taking place. It is, indeed, a war of "iron," and the thunderbolts wielded by Jove were trifling compared with modern engagements on land and sea. All of us, must yearn for the happier times when the metal iron, to whose qualities we metallurgists bow down in the many fascinating studies it presents to us, will once more be used only in the arts of peace. Exaggerated claims were made a few years ago that nickel steel would resist corrosion. No doubt if the metal is present in high percentages the product is more highly resistant, but in the end it will also corrode, and quite badly. Moreover, as regards ordinary commercial nickel steels of lower percentages, while they show somewhat lower corrosion, it is found that, when deterioration once commences, corrosion continues at not much less rate than in ordinary steel.

Results of Former Tests

In this connection, reference may be made to some experiments carried out by the author in 1892. In his paper on "Alloys of Iron and Chromium," read before the British Iron and Steel institute in 1892, it was pointed out that an alloy containing about 9.18 per cent of chromium and 0.71 per cent of carbon showed a loss of 5.64 per cent after being immersed for 21 days in sulphuric acid of 50-per cent volume, compared with 44.7-per cent loss of wrought iron. The data taken during these tests are

An introductory address delivered by the president of the Faraday Society, England, before a recent meeting devoted to a discussion of the corrosion of metals. The extensive work of Sir Robert Hadfield is outlined in this address.

Table I

Tests of Iron and Chromium Alloys

Mark of the specimen in the Hadfield research		Percentage of C	Cr	Strength of acid (H_2SO_4) per cent	Length of immersion days	Loss per cent	Color after treatment
Chromium steel (F)	Bar	0.27	1.18	50	21	3.32	Bright appearance in some parts.
Chromium steel (J)	Bar	0.77	5.19	50	21	4.78	Tarnished, no bright appearance.
Chromium steel (L)	Bar	0.71	9.18	50	21	5.64	Dull and tarnished.
			Si.				
Silicon steel (E)	Bar	0.20	2.67	50	21	3.32	Very bright appearance.
Ordinary mild steel	Bar	....	....	50	21	7.48	Dull bright.
Wrought iron	Bar	....	....	50	21	44.70	Most brilliant.

Table II.

Specimen No.	Analysis C	Si	S	P	Mn	Cr	Treatment	Tensile tests: Elastic limit, tons	Maximum load, tons	Elongation, per cent	Reduction of area per cent	Bending test
1176M.	1.27	0.38	0.10	0.03	0.25	11.13	Unannealed	30 to 35	62	10	11	24 degrees broken.
							Annealed for four days at a high red.	Bar began to track in thread at 5 tons up to breaking at 33 tons				14 degrees broken.
1177M.	1.06	0.63	0.12	0.06	0.08	10.83	Unannealed.	35 to 40	72	5	5	nil broken.
							Annealed for four days at a high red.	26	56	12	12	68 degrees broken.

Table III

Results of Corrosions Test Made by Sir Robert Hadfield

Specimen	Analysis per cent C	Si	Mn	Ni	Cr	W	Condition of material	After 32 days in water Loss per cent	After 33 days in sea water Loss per cent	After 17 days in 50 per cent H_2SO_4 Loss per cent	After 21 days in 50 per cent H_2SO_4 Loss in grams	Loss per cent	Remarks
A	0.47	....	0.95	.....	....	....	Forged	0.15	....	0.80	.....	....	Particulars of these are taken from the Author's joint paper on "Iron, Nickel, Manganese, Carbon Alloys," read before the Institution of Mechanical Engineers in 1905.
B	0.48	....	0.75	1.20	....	....	Forged	0.11	0.23	1.10	.....	....	
C	0.47	....	0.86	2.15	....	....	Forged	0.10	0.26	0.72	.....	....	
D	0.40	....	0.82	4.25	....	....	Forged	0.11	0.26	0.71	.....	....	
E	0.42	....	1.03	4.95	....	....	Forged	0.12	0.24	0.66	.....	....	
F	0.52	....	0.92	6.42	....	....	Forged	0.12	0.23	0.58	.....	....	
G	0.43	....	0.79	7.95	....	....	Forged	0.12	0.23	0.54	.....	....	
H	0.41	....	0.85	12.22	....	....	Forged	0.10	0.23	0.44	.....	....	
J	0.45	....	0.83	15.98	....	....	Forged	0.09	0.18	0.28	.....	....	
K	0.41	....	0.96	19.91	....	....	Forged	0.09	0.14	0.28	.....	....	
B	0.15	....	....	.....	....	0.20	Forged	....	....	....	3.055	5.01	Extracted from the author's paper on "Alloys of Iron and Tungsten," read before the Iron and Steel Institute in 1903.
G	0.21	....	....	.....	....	1.49	Forged	....	....	....	2.162	3.50	
H	0.28	....	....	.....	....	3.40	Forged	....	....	....	1.392	2.25	
I	0.38	....	....	.....	....	7.47	Forged	....	....	....	2.797	4.50	
L	0.76	....	....	.....	....	15.65	Forged	....	....	....	3.920	5.75	
M	0.78	....	....	.....	....	16.18	Forged	....	....	....	3.574	5.50	
Ordinary steel	0.40	....	0.80	.....	....	....	Forged	....	....	....	.....	3.97	
Mild steel	0.25	....	....	.....	....	....	Forged	....	....	....	.....	2.09	
Nickel-iron alloy	0.16	....	....	24.51	....	....	Cast	....	....	....	.....	1.37	
Platinoid	....	....	....	.....	....	....	.....	....	....	....	.....	0.35	"The loss noticed did not differ greatly from those met with in the tests on iron, manganese, silicon, aluminum, chromium and nickel alloys. They are somewhat more than on nickel steel."
Metallic chromium	....	....	....	.....	98.0	....	.....	....	....	....	.....	0.03	
Metallic manganese	....	....	99.00	.....	....	....	.....	....	....	....	.....	10.60	
Nickel	....	....	....	98.50	....	....	.....	....	....	....	.....	very slight	
Iron	....	....	....	.....	....	Fe 99.80	.....	....	....	....	.....	4.52	
Chromium steel F	0.227	....	....	.....	1.18	....	Forged	....	....	....	.....	3.32	Extracted from the author's paper on "Alloys of Iron and Chromium," read before the Iron and Steel Institute in 1892.
Chromium steel J	0.77	....	....	.....	5.19	....	Forged	....	....	....	.....	4.78	
Chromium steel L	0.71	....	....	.....	9.18	....	Forged	....	....	....	.....	5.64	
Silicon steel E.	0.20	2.67	....	.....	....	....	Forged	....	....	....	.....	3.32	
Mild steel	....	....	....	.....	....	....	Forged	....	....	....	.....	7.48	
Wrought iron	....	....	....	.....	....	....	Forged	....	....	....	.....	44.70	
1287 C	0.13	0.23	0.72	0.95	....	....	Cast	....	....	....	2.003	3.23	Extracted from the author's paper on "Alloys of Iron and Nickel," read before the Institution of Civil Engineers in 1899. These samples were immersed for 21 days in 50 per cent H_2SO_4.
1287 E	0.19	0.20	0.65	3.82	....	....	Cast	....	....	....	1.611	2.95	
1287 G	0.17	0.28	0.68	7.65	....	....	Cast	....	....	....	1.581	2.77	
1287 I	0.18	0.22	0.93	11.39	....	....	Cast	....	....	....	1.390	2.60	
1287 M	0.14	0.38	0.86	29.07	....	....	Cast	....	....	....	0.759	1.34	

These results, representing corrosion tests carried out by Hadfield during the last 23 years, are plotted together in the diagram which accompanies this paper.

included in Tables I and II, page 657.

Table II shows the results of the mechanical tests. Each sample, ½ x 2½ x ¼ inches was immersed for 21 days H_2SO_4 of 50-per cent strength. The samples "F" (1.18-per cent Cr.), "J" (5.19-per cent Cr.), and "L" (9.18-per cent Cr.) showed a loss of 3.32 per cent, 4.78 per cent, and 5.64 per cent, respectively. Ordinary mild steel, tested under the same conditions, lost 7.48 per cent and wrought iron 44.7 per cent.

In order to determine the corrosion of metallic chromium, experiments were conducted with a number of specimens containing 99.35 per cent chromium.

In addition to the foregoing the author has made a large number of corrosion tests as shown in Table III, and referred to in his various papers during the last 25 years on alloys of iron, to which have been added the following special elements: Nickel, tungsten, chromium, silicon. The various results shown in Table III are shown in graphical form in the accompanying illustration.

Heat Metering and Control

In a paper noted in the proceedings of the Steel Treating Research society, Richard P. Brown describes a new instrument for the precise measuring of temperature through a high-resistance millivoltmeter.

In this instrument, in addition to the standard high-resistance millivoltmeter, is used an ordinary dry cell about 1¼ inches in diameter by 2½ inches long, and a suitable rheostat to reduce the voltage of the dry cell from approximately 1½ volts to a range from 0 to 60 millivolts, the voltage produced as a maximum by the thermocouples. In the operations adjustments are first made to insure that the voltage developed by the thermocouple is equal to the reduced voltage of the dry cell. Then the voltage of the thermocouple is cut out and the voltage of the dry-cell circuit read by direct deflection, which eliminates the line resistance entirely, just as a potentiometer gives a deflection indicating the actual temperature developed by the thermocouple at the moment of reading the instrument. It does not, however, indicate the fluctuation in temperature of the thermocouple, since it is the voltage from the dry cell that is being read.

From his experience the writer states that for industrial service an instrument actuated by the expansion of nitrogen gas is the most satisfactory for temperature measurement up to 800 degrees Fahr.

This instrument consists of a bulb of copper which is inserted in the heat and is connected by capillary tubing to an indicating or recording gage containing a helical expansive spring. The expansion of the gas in the bulb exerts a pressure in the capillary tubing which is conveyed to the spring in the instrument and the pointer attached directly to thi spring moves across the scale or chart.

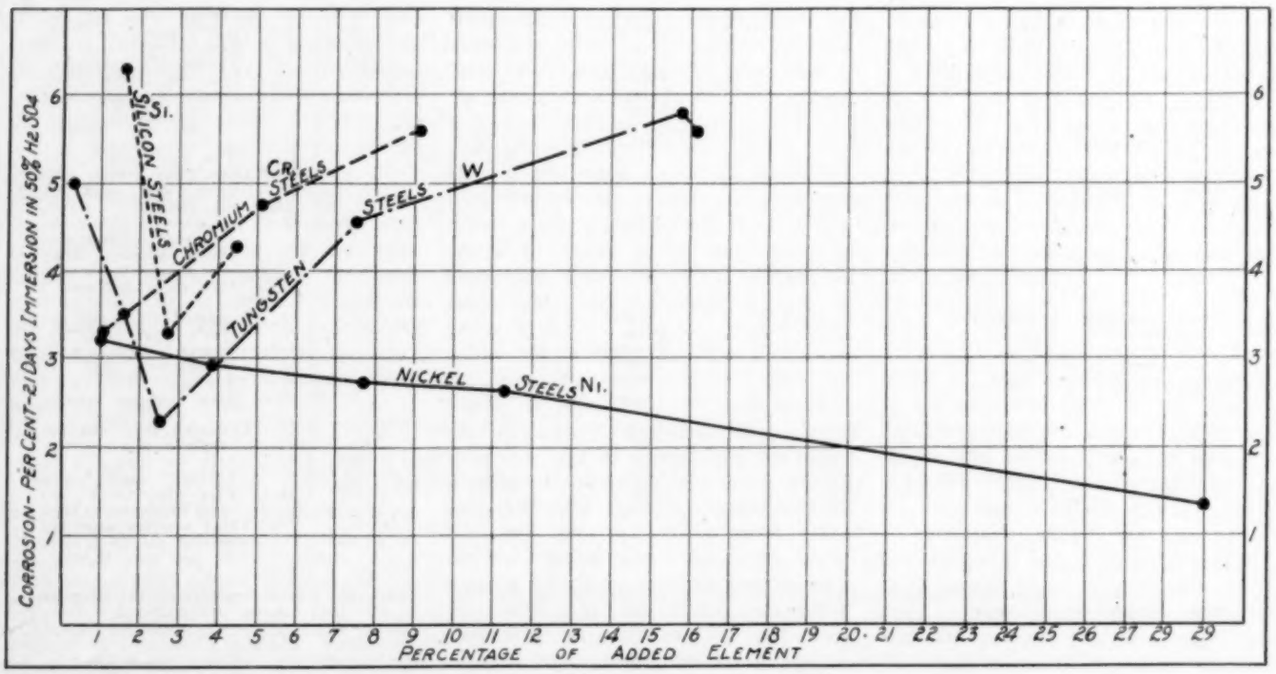
Makes Portable Pipe Vise

A portable pipe vise in which the gripping device consists of a pair of jaws and a steel chain lately has been marketed by the Gerolo Mfg. Co., Chicago. The vise may be attached to a column by a wrought iron chain which is riveted to the base of the vise. The tightening of an eyebolt nut draws up the supporting chain and secures the vise in position. Pipe is held in the vise by means of the jaws and steel chain previously mentioned; the clamping action is accomplished by the movement of the handle toward the vise. This handle fulcrums on a steel pin, which projects through two bosses.

Makes Small Toolholder

A new style of toolholder has been designed by the Ready Tool Co., Bridgeport, Conn., for the purpose of meeting the requirements of users of bench and watch lathes. This work requires a toolholder of unusually small size. The holder is a heat-treated drop forging and is broached for the cutter. Its dimensions are 5/16 x ½ x 3½ inches and a 3/16-inch square cutter is supplied.

Announcement was made recently of the invention of a commercial process for converting bituminous coal into a new fuel said to be the equivalent of anthracite coal. This fuel is said to be completely smokeless in character, hard and dense in structure, and occupies approximately the same space as run-of-mine coal. Coal by-products are recovered in the conversion. The coal, together with its by-products, will be marketed by the International Coal Products Corp., New York, recently formed for that purpose. C. H. Smith, inventor of the process, is president of the new company.



The By-Product Oven—A Paradox

Developed to Produce Coke, the By-Product Oven is Now Fostered for the Useful Residues So Valuable to Industry and to the War—These Will Also Be Valuable in Peace Time

BY WILLIAM HUTTON BLAUVELT

THE technical and engineering problems in the manufacture of coke are today the problems of the by-product oven. Except in a few special localities, practically no beehive ovens have been built in the United States for the last five or six years except as renewals of old plants, and during these years the total number of beehive ovens in existence has been steadily falling. On the other hand, the number of by-product ovens has increased from 4624 in 1911 to a total of about 7660 in operation at the end of 1917; with 2800 building this makes a total of about 10,460 which will be in operation in 1918, or shortly thereafter.

Preliminary government estimates place the total production of coke for 1917 at 56,600,000 tons, the largest tonnage in the history of the industry. Of this 34,000,000 tons or 60 per cent was beehive, and 22,600,000 tons, or 40 per cent, was by-product coke. Some time in 1918 the production of by-product coke should pass the beehive output, and when the by-product ovens now building are completed the total by-product capacity will be about 40,000,000 tons of coke per annum, which is over 70 per cent of the record-breaking total coke production of 1918.

Improvement in Oven Design

Since the by-product oven was brought to this country from Europe, in 1892, it has been radically improved, and from the point of view of American metallurgical practice it is safe to say that the American ovens are superior to those of Europe. The points of superiority are mainly those of larger units and larger output per unit, and the extent to which labor-saving machinery has been introduced. The increased output is due largely to the use of silica refractory material, which permits higher heats and shorter coking time than are employed in Europe. The modern American oven will carbonize commercially more than 20 tons of coal per day, and contrary to the European idea that slower operation is necessary to conserve the plant, this rate of operation with only current repairs, can be maintained for an indefinite time.

From a paper presented at a recent meeting of the American Institute of Mining Engineers. Mr. Blauvelt is a consulting engineer with offices in Syracuse, N. Y. He is coke expert for the council of national defense.

Services of the By-Product Coke Process

IT is difficult to suggest any industry which does more to conserve our resources than the by-product coke industry. Mr. Blauvelt designates some of these services, stating:

"The by-product oven gives this country something more than a cheaper method of producing coke. It gives the coke user a material which can be adapted accurately to his special needs. It renders available many coal deposits not heretofore considered suitable for making coke. It furnishes a new and large supply of gaseous and liquid fuel for metallurgical, industrial and domestic uses. It adds very greatly to the supply of available fertilizers which the overworked and underfed lands are coming to need so sadly. It furnishes an abundant supply of raw materials for a number of chemical industries, especially the great dye and color industry which war experience has shown is vital to a large number of manufacturing operations."

The by-product oven is not old enough in the United States to make it possible to state from experience how long an oven can be operated at maximum efficiency. There are a number of plants in different parts of the country which were built 16 or 18 years ago, which are more efficient today than in the first year of operation, and which show costs of operation which compete well with those of the most modern plants.

The accompanying illustrations, Figs. 1 and 2, show the earliest and the latest development of one of the prominent types of ovens in use in this country. The illustrations show the principal changes in the design. The first ovens had a capacity for carbonizing 4.4 tons of coal per day, as compared with the present capacity of over 20 tons mentioned previously.

The early ovens were economical in heat consumption because the heat in the waste gases was utilized efficiently in raising steam for the operation of the plant. On account of the growing demand for oven gas for metallurgical and other uses, the change to the regenerative type of oven has been general. While this type of oven is not so economical of the total heat produced by the combustion of the gas as is the combined oven and boiler plant, it makes available for use half again as much of the surplus gas as did the older type of oven. Modern ovens require for carbonization of the coal less than 40 per cent of the total heat in the gas produced.

The Modern Oven

Fig. 2 illustrates one of the principal types of the modern oven. This type of oven is essentially a closed chamber, heated from the outside, and the volatile matter of the coal is distilled, air being carefully excluded. This point distinguishes it in principle from a beehive oven, where the heat is generated by combustion within the oven itself, with the resulting wastage of everything except the coke. The oven shown consists of a chamber of about 36 feet long, 12 feet high and of a width depending upon the coal that is to be carbonized. In American practice the average width varies from 16.5 to 21 inches. Modern ovens usually have about 2 inches of taper toward the discharge end to facilitate pushing the coke.

The ovens are usually heated by a portion of the gas recovered from coal distillation, although sometimes producer gas is substituted. In all the successful ovens this gas is burned in a series of flues which control the travel of the burning gases and distribute the heat over the entire side of the oven. The success of any oven design depends very largely upon the ability to distribute the heat correctly over the entire surface which forms the wall of the oven. It is by no means an easy problem to control this distribution accurately over an area

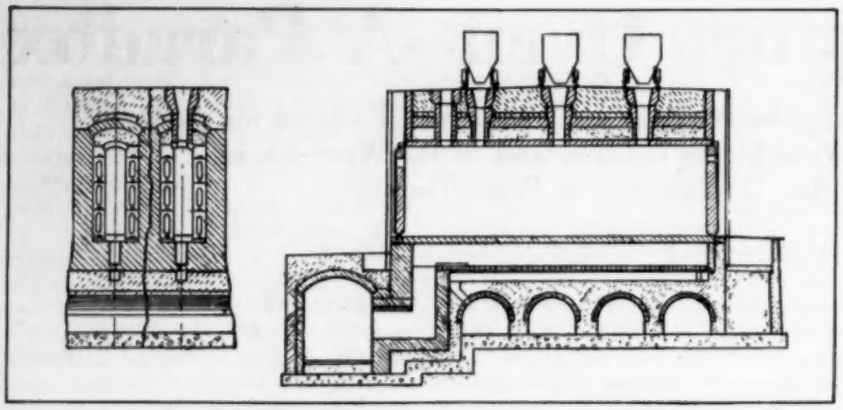


FIG. 1—AN EARLY TYPE OF BY-PRODUCT COKE OVEN

of 432 square feet. In some ovens the flues composing the heating system are vertical and in others horizontal. The oven shown is the chief example of the latter arrangement.

Heating the Oven

Fig. 3 shows the flow of the air and gases through the system. From this it will be noted that one pair of dampers near the stack reverses the air and gas. The cold air enters the system from a fan located at a point near these dampers, flows through one of the two main flues, and is distributed to the regenerators by a system of firebrick slides. The air is heated in the regenerators to about 1000 to 1100 degrees Cent. before entering the flue system of the oven and meeting the gas to be consumed.

This gas is supplied at several points in the flue system. It flows steadily through the supply pipes and its direction in the oven is reversed by the reversal of the current of air, so that no attention need be given to this point by the operator. That is, when the currents are flowing upward through the flue system each gas stream is bent upward and burns in the flue above the gas pipe, which is opposite the partition wall. When the flow is downward, the gas streams are bent downward. By means of these several supplies of gas the heat is supplemented as needed and all the air supplied is consumed by the last admission of gas. The products of combustion pass out to the other regenerator and thence to the reversing dampers and chimney in the same manner as in an open-hearth furnace.

In the earlier types of ovens, when luminous gas was used, much of the heating was done by radiation, but in modern practice, where the benzol is removed from the gas, the combustion is not luminous and the heating is done mainly by conduction. To this end, in the system described it has been found to maintain a reasonably high velocity of the hot gases in the flues. This is attained through the principle which has been developed in some types of hot-blast furnace stoves and other furnaces, where a high velocity of the hot gases transfers heat to the adjacent surfaces by sweeping away the sluggish layers of gas lying against the surfaces, which, if not removed, would form efficient nonconductors of heat.

The total heat delivered to the combustion flues is regulated by the pressure on the supply of air and gas; and the distribution of the heat among the various flues is controlled by a regulation of the relative amount of gas to each flue. Each flue may be inspected through a peephole accessible from the working platform outside.

Operation of By-product Oven

The coal is charged into the oven from a hoppered larry car running on the top of the oven structure, usually through four charging-holes. The fifth hole, shown in Fig. 2, serves to carry off the volatile products of the distillation. The coal is leveled after charging by an auxiliary ram on the coke pusher, the space being left between the top of the coal and the top of the oven for the outgoing gases to reach the point of discharge.

Upon completion of the coking process the doors are raised, and the coke is pushed out by an electrically operated ram. The doors are then lowered and sealed and the oven is ready for another charge. Many attempts have been made to develop a mechanically sealed door, but the conditions of operation make this mechanical sealing a difficult problem, and nearly all plants still use the mud joint. Careful designing of the door and its seat make this mudding a much less serious matter than might be supposed.

Use of Silica Brick

Silica brick is largely used in modern by-product oven construction. There seemed at first many obstacles to its successful use for such construction, the principal objections were the large amount of expansion of the brick when heated and the tendency to spall, due to sudden changes in temperature. When silica brick was first used in the crowns of beehive ovens it was thought that it would be an absolute failure, but it was unexpectedly successful. It was first employed in by-product ovens at the plant of the Cambria Steel Co. and was soon after generally adopted. It has been found that, since most of the expansion takes place below a red heat, the variations in temperature during operation do not give any trouble, and the superior resistance of silica brick to high temperatures and its satisfactory conductivity under operating heats make it a superior material. Notwithstanding its success in American practice, it has not been employed to any extent in Europe.

The cubic capacity of a by-product oven has increased nearly fourfold since its first introduction into this country. The larger capacity reduces the cost of operation per unit of product, and the smaller number of units also reduces cost of construction and repairs. Increases in length and height of the oven chamber have no effect on the product and are limited only by structural and heating conditions. The width of the oven, however, is a more important factor.

In the early days of the by-product oven in Europe it was thought that the lean coals of Belgium, running

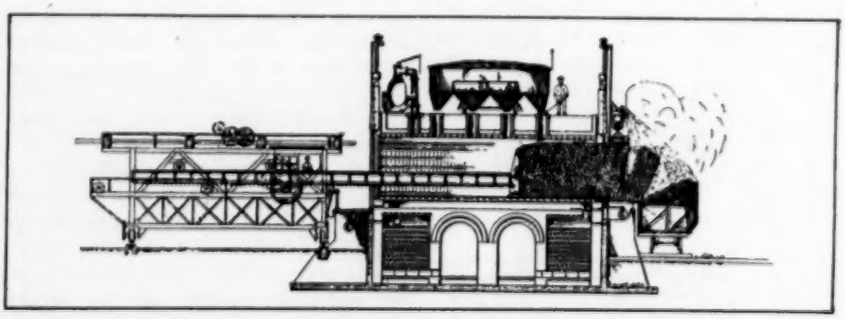


FIG. 2—A TYPE OF MODERN BY-PRODUCT COKE OVEN

as low as 15 per cent volatile, required a very narrow oven, perhaps not over 14 inches wide, while for high-volatile coals a width of 20 inches was not infrequent. American practice has not demonstrated any such simple rule as this, and the reason may be found partly in the fact that oven plants are generally located at the point of consumption of the coke. Hence mixtures of coals can be more easily obtained, and for this reason most plants operate on about the same average percentage of volatile matter. It has not been definitely shown in American practice that a particular width of oven is best suited to coal of a certain composition.

The advantages of a narrow oven are: A faster coking time per inch of width with a given flue temperature; a higher yield of by-products, and a more uniform cell structure as between the portion of the coke nearest the wall and that nearest the center of the oven.

On the other hand, the larger number of operations of the oven crew when handling the narrower ovens increase the labor cost and the repairs. It has yet to be developed what is the best oven width to average these conditions. The widest ovens operating in this country have an average width of 21 inches and the narrowest 15 inches. Some coals require higher temperatures than others to produce the best coke, but it is not clear that this fact will lead to the selection of wider ovens for such coals. It is not clear that any width is definitely the best for a given set of conditions, but much study is being given to this subject, and we may before long have some better data.

The Quality of Coke

It is the physical structure which gives coke its advantage for metallurgical work over other forms of solid fuel, and it is important that the structure should be adapted to the conditions under which the coke is to be used. The blast furnace is the greatest coke consumer. In the days of the beehive oven one kind of coal gave a coke with one certain physical structure, while another coal gave another structure. Furnaces either adapted their practice to the coke, or changed their coke supply. Coke was recognized as hard or soft, porous or dense, and that was about all that was known regarding physical structure.

The by-product oven, with its variable mixtures of coals, variable heats, coking time, width of oven, fineness of coal charged and other controlling factors, permits a control of coke structure formerly impossible. The problem is to determine first, what is the structure best adapted to standard furnace practice, while recognizing that special practice requires modifications of structure; second, what conditions are necessary to produce it.

The production of a high heat at the tuyeres is of the first importance, and the best coke is that which reaches the tuyeres in proper condition to produce the highest temperatures in the tuyere area, and in just sufficient quantity to do the amount of work required. The ideal coke is one which will descend through a furnace shaft to the combustion zone in front of the tuyeres with the least loss from attrition and oxidation, and when it arrives there will burn at the highest possible rate. Of course, these

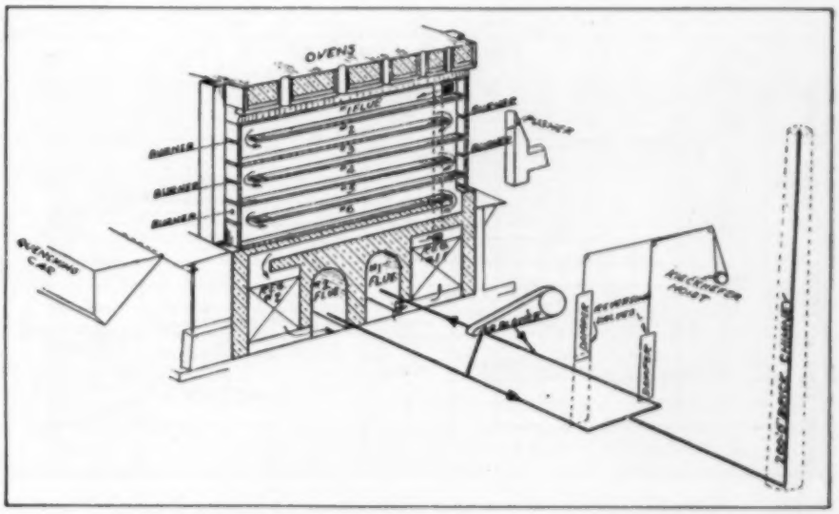


FIG. 3—DIAGRAM SHOWING THE FLOW OF GASES AND AIR

are paradoxical qualities. Walther Mathesius in his interesting paper on "Chemical Reactions of Iron Smelting" stated that this is accomplished by producing coke with an open-cell structure, in which the cell walls themselves are amply strong and well protected by a graphitic coating.

The time of contact of the blast with the coke in the tuyere area can be only a few seconds and the speed of any chemical reaction decreases as the relative quantities of reacting and resulting substances approach equilibrium. Therefore, the farther these relative quantities remain from the status of equilibrium, the higher the rate of resultant combustion. I am disposed to believe that we should, in seeking to produce the best blast-furnace coke, aim to produce an open-cell structure, with cell walls strong and hard. It is not necessarily true that the open-cell structure is the same thing as a high percentage of cell space. The advantage of an open-cell structure is that it gives the oxygen of the air easy access to the carbon. It is entirely possible that a coke of very fine cell structure, having say 50 per cent of cell space, might offer less surface for prompt combustion under practical conditions than another coke containing larger cells but having the same percentage of total cell space.

The composition of the cell wall it is agreed should be hard, thin and strong. The factor suggested by Mr. Mathesius that it should be covered with a graphite coating that is smooth and bright, is a much more complicated matter. What are the conditions of coal mixture and coking which produce this kind of wall? The coal mixture, the degree of fineness of grinding, the coking time, and the heats are probably all factors.

In addition to the blast furnace, foundry cupolas afford a steady market for coke, and in recent years the domestic market has grown to importance. Before the war, sales of coke for domestic use amounted to over 1,500,000 tons per annum. These sales really demonstrated the value of coke as a domestic fuel rather than showed what were the ultimate possibilities of the trade. Foundry coke is usually made in a slower coking time than furnace coke, as cupola practice calls for larger and tougher pieces.

Preparing Coal for Coking

The practice of locating American ovens at the point of consumption of the coke has made it easy to bring together several coals of different qualities, and this has in many cases permitted the production of a better coke by admixture than could be made from either of the coals used alone. For example, a coal of excellent cok-

ing qualities but high in ash can be mixed with a low-ash coal of poorer cokability, or an excess or deficiency in the coking quality of the main coal supply can be corrected by mixture with another coal.

Except in cases where the source of coal supply is fixed, it seems desirable to arrange the plant for the preparation and mixing of as many as three kinds of coal. Means for accurately proportioning the different coals are essential in such a plant. The mixture of coals requires fine grinding in order to bring the particles of the different qualities of coal close together. The general practice is to grind so that from 70 to 80 per cent will pass through a ⅛-inch screen. This fine grinding is also often advantageous where there are many pieces of slate of considerable size in the coal, since each large piece of slate in the coke is usually a center of cracks that tend to shatter the structure. Fine grinding reduces the weight of the coal mass per cubic foot, and consequently the capacity of the oven. With ordinary coals the weight per cubic foot of charge is generally taken at from 40 to 43 cubic feet per ton, depending somewhat on the coal and largely on the degree of fineness.

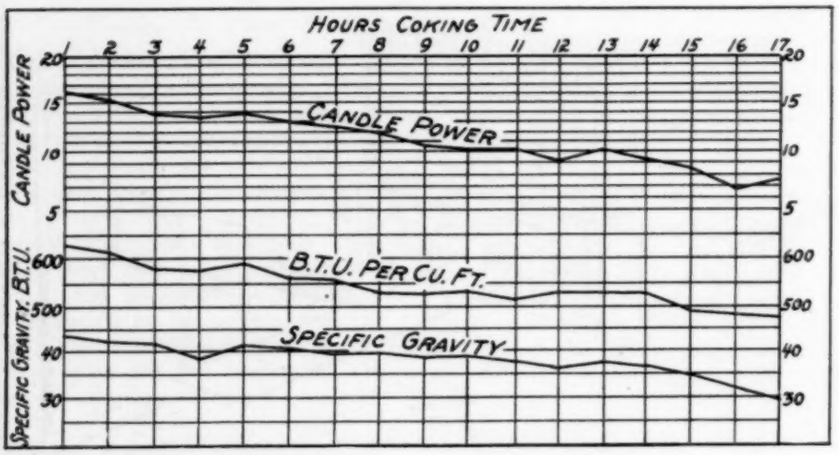


FIG. 4—DIAGRAM SHOWING AVERAGE HOURLY ANALYSIS OF GAS FROM ONE OVEN-COAL 25 PER CENT VOLATILE

Permits the Use of Low-Grade Coals

The by-product oven, with its control of heats, coking time, mixture of coals and fineness in grinding, has permitted the use of many coals for making metallurgical coke which would not have been suitable with the beehive oven. This is important as the best coals are being progressively exhausted. Owing to the extraordinary conditions caused by the war, some coals hitherto considered entirely unsuitable for making metallurgical coke have been successfully used; for example, the unwashed coals of southern Illinois.

The distillation or coking of coal in closed retorts, now generally known as by-product ovens, was first introduced for the purpose of saving the several valuable products contained in the volatile matter of the coal, which were all destroyed in the beehive process. The advantages in the production of coke previously outlined were not then realized. In fact it was often thought that a sacrifice of coke quality must be accepted in order that the by-products might be recovered. It has developed, however, that the best oven conditions for the production of coke are, in general, the best for the production of by-products.

The composition of the volatile matter in bituminous coal is very complex and the changes through which these compounds pass during the process of distillation are complicated. It is not appropriate here to attempt to trace out these changes or to discuss the method of formation of the ammonia, benzol or other by-products. It is well known that only about one-fifth of the nitrogen in the coal combines with hydrogen to form ammonia, and that the remainder is found in the coke and gas.

Attempts have been made to obtain higher yields of ammonia by blowing steam into the coke, somewhat after the manner followed with the Mond producer, which recovers from three to four times as much ammonia but none of these processes has been developed commercially. Higher coking heats tend to break down the combinations to their ultimate elements. For example, the gas produced from high-temperature coking will contain more hydrogen and less marsh gas, and a larger volume will be produced of lower calorific value. When coking at very low temperatures, practically no benzols are produced and the hydrocarbons recovered are of the aliphatic series. At high coking temperatures the tendency is for the toluol, the more complex hydrocarbon, to break down into benzol.

Cooling the Gas

The gases passing off from the oven are heavily laden with various hydrocarbon vapors and with water vapor and consequently carry a large amount of latent heat. So the cooling of the gas and the condensation of the vapors require efficient condensing apparatus and large amounts of water. The gas works manager of early days used to deal gently with the gases in removing the tarry vapors and they were cooled slowly in order to prevent their taking up the benzols from the gas, with injury to the illuminating power. In coke oven practice this precaution is not considered necessary.

Much improvement has been effected in the efficiency of the condensing apparatus since the early days of the tubular cooler, in which the gas circulated around the tubes of an apparatus similar to a vertical boiler, while the cooling water flowed through the tubes on the countercurrent principle. I have in mind one single-stage condensing apparatus 10 feet in diameter and 45 feet in height of effective cooling surface in which 12,000,000 cubic feet of gas per day are cooled on the average from 80 to 20 degrees Cent.; in which the cooling liquor enters the apparatus at a temperature 5 degrees below the exit temperature of the gas, and leaves it at not more than 10 degrees below the entering gas temperature. In such an apparatus very little condensate separates from the gas at a low temperature, and as a result the benzols remain in the gas and the separation of tarry matter from the ammonia liquor is sharp and easily effected.

Removing the Tar

A small quantity of the lightest tar vapors remains in the gas with the benzols. These may be removed by some efficient form of the old Pelouse and Anzin tar extractor, or when the gas is washed with water to remove the ammonia in the indirect process of ammonia recovery, these light tars are efficiently washed out. An efficient system of removing these light tars in a high-tension electrical field has been developed by F. W. Steere, the plan adopted being similar to that used in the Cottrell system, except that the special conditions per-

mit the use of an alternating current of the necessary high voltage. The problem is merely the agglomeration of the minute globules of tar to permit their effective removal by tar extractors of the usual type. This process has been worked out commercially.

Using Tar as Fuel

One of the interesting developments in the operation of by-product ovens in connection with steel plants is the growing use of tar as a fuel for metallurgical furnaces. One plant produces over 20,000,000 gallons of tar per year, in which the entire amount has been utilized for years as fuel in open-hearth and heating furnaces, where its value as fuel is much higher than its value in the ordinary tar market. Generally speaking, the tar used in steel furnaces is handled in the same manner as ordinary petroleum fuel oil, as it has about the the same viscosity. Its use presents no difficulties after the details of application have been worked out. It has a higher fuel value per gallon than ordinary petroleum fuel oil.

It was formerly the practice to extract the ammonia from coke oven gas by scrubbing with water, which has a large capacity for absorbing ammonia at moderate temperatures. This was the old gas works method, and the processes as used in oven plants are the same except as modified to meet the conditions of large volumes and efficient recovery. The ammonia is recovered by absorbing processes in the form of a crude liquor, usually containing from 0.5 to 1 per cent of ammonia.

The liquor usually contains practically all of its ammonia in the free state, whereas the condensate from the coolers carriers considerable amounts of fixed ammonia, sulphate, carbonate, chloride and sulphide. After removal of the tar by decantation the combined liquors are distilled with steam, after setting free the fixed ammonia by means of lime, the product being the crude ammonia liquor of commerce. In other plants the vapors from the still are passed through a sulphuric acid bath and sulphate of ammonia is formed.

Reclaiming Ammonium Sulphate

The socalled direct and semidirect processes for the manufacture of ammonium sulphate have been very generally applied to oven plants in recent years. The direct process requires only the removal of the tar from the gas without any more cooling than is necessary for this purpose, after which the gas is passed through a bath of sulphuric acid and the sulphate recovered. The direct process has been applied to a considerable extent in Europe, where the percentage of chlorides in the coal is quite small. Where the amount of chlorides is relatively large it is necessary to remove them before the acid bath is reached.

This introduces the semidirect process, in which the gas is cooled to remove the chlorides and then reheated and passed into the acid. The fixed ammonia condensed out in the cooling process is distilled and generally the ammonia from the stills is returned to the gas before it reaches the acid bath. The percentage of ammonia that has to be distilled in the semidirect process depends upon the amount of fixed ammonia in the gas and varies from 15 to 40 per cent of the total ammonia in the gases.

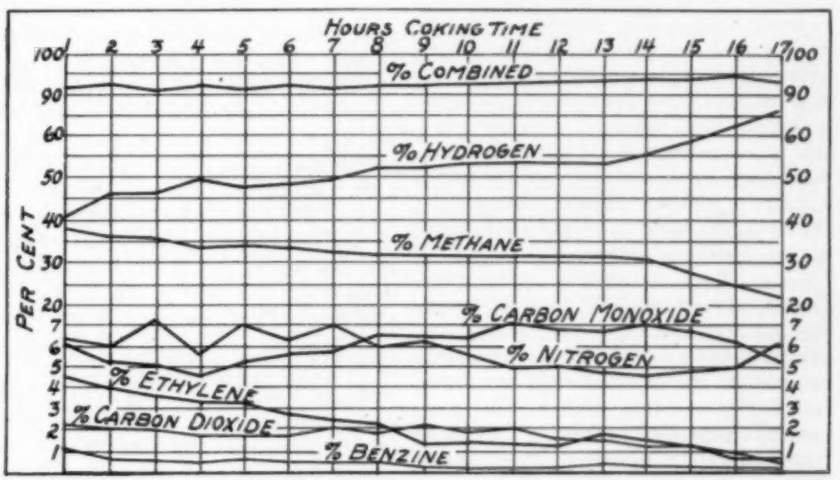

HOURS COKING TIME
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
% COMBINED
% HYDROGEN
% METHANE
% CARBON MONOXIDE
% NITROGEN
% ETHYLENE
% CARBON DIOXIDE
% BENZINE
PER CENT
100 90 60 50 40 30 20 7 6 5 4 3 2 1

FIG. 5—AVERAGE HOURLY HEATING VALUE, SPECIFIC GRAVITY AND CANDLE POWER OF COKE OVEN GAS ANALYZED IN FIG. 4

Sulphate of ammonia was formerly the only source from which pure ammonia in the form of *aqua ammonia* or anhydrous ammonia was produced. This process consists in the distillation of the sulphate of ammonia using lime to free the ammonia from the sulphuric acid, the small amount of hydrocarbons remaining in the sulphate being removed by charcoal filters or similar means.

If anhydrous gas is to be produced the gases in the top of the still are dried by means of quicklime or other desiccating material, and the pure gas is then compressed and pumped into steel cylinders. *Aqua ammonia* is produced by absorption of the pure gas in distilled water. This process is essentially a simple one, but the purification of the ammonia gas and the necessity for providing against the blocking of the apparatus by accumulations of calcium sulphate scale somewhat complicate the work.

In recent years by refinements in the distillation process it has been made possible to produce pure ammonia direct from the crude weak liquor and this product is equal in quality to that produced from ammonium sulphate by the method described. These processes have the advantage of avoiding the waste of sulphuric acid inherent in the ammonium-sulphate process.

War and the Ammonia Market

The war has introduced many unprecedented conditions to the ammonia producer. Before the war the price of sulphate of ammonia varied, in general, between 2½ and 3 cents per pound. Official quotations are now running from 7.25 to 7.35 cents. While these high figures do not represent the average of actual transactions, any more than the $55 per ton frequently quoted represented prices at which the pig iron of the country was moving last summer, yet they illustrate the unsettled conditions of the market. Recently the government has asked for large amounts of ammonia for war purposes, and this call for ammonia has introduced much discussion as to the best methods of production.

Disposition of Ammonia

In times of peace the great bulk of the ammonia goes into sulphate for fertilizer purposes, and most oven plants have been built for supplying this product. The government's needs have caused many inquiries regarding the changing of these plants to produce other forms of ammonia, but this is usually out of the question on account of the great time and expense involved. Large parts of the recovery plants would have to be entirely rebuilt in order to change

the product. Fortunately there are several practical methods for the conversion of ammonium sulphate into ammonium nitrate, and the synthetic ammonia plants will soon have a large production directly available for this purpose. The total ammonia from all oven plants now built or building is estimated at somewhat over 130,000 tons of ammonium nitrate per annum.

Coke Oven Gas

Since the first introduction of by-product ovens into America many experiments have been made in the use of oven gas for metallurgical furnaces, and several experiments have been recorded describing unsuccessful efforts to apply it to open-hearth steel furnaces, although it has long been used in heating other furnaces, soaking pits, etc. During the last few years, however, the whole subject of using oven gas in open-hearth furnaces has been successfully worked out, and it is now in regular operation in several important steel plants. Since the benzol is now generally extracted from oven gas, it is the practice to burn a certain amount of tar along with the gas to give it luminosity and higher radiating power.

From 12 to 16 gallons of tar, together with from 8000 to 8200 cubic feet of gas, the quantity depending upon its calorific value, are required per ton of ingots produced, and it is found that furnaces fired in this way can be depended upon to produce from 10 to 15 per cent more steel than when heated with producer gas. These figures are based on work at stationary furnaces. On the basis of these figures it may be stated that the surplus gas and the tar obtained in the production of a ton of coke will furnish the necessary fuel to produce a ton of ingots from an open-hearth furnace. Without considering the value of the other by-products recovered, this statement illustrates the importance of the by-product oven as a fuel supply to a blast furnace and steel plant.

Early in the development of the by-product oven in America the principle of the separation of the richer portion of the gas, which comes off during the early part of the coking period, from the leaner portion, was developed in a practical way. This has enabled the oven plants to produce gas for sale having a calorific value much higher than could be produced in ordinary gas works from the same coal. The accompanying charts (Figs. 4 and 5) show the composition of a gas from an oven running on a coal of about 25 per cent volatile matter, analyses being taken each hour during the coking period. At the time these analyses were made the oven was coking at the rate of about 1.15 inches of width per hour. This chart shows the progressive decrease in the percentages of methane and the progressive increase in hydrogen and carbon monoxide, as the coking proceeds.

The separation of the rich from the lean portion of the gas is probably not advantageous when the surplus is to be used for fuel purposes, as, of course, separation introduces some complications into the apparatus, but where a higher calorific value than the average is desired, the separation method is of great value and can be controlled accurately.

Before the general use of the by-product oven, benzol and its homologues, toluol and xylol, or solvent naphtha, were produced from the distillation of tar, which usually contains about 3 per cent of these compounds. Now the main source of supply is coke oven gas, from which the benzols are scrubbed by bringing the gas into contact with a heavy oil of petroleum or tar. The process is usually carried on after the removal of ammonia. The benzolized heavy oil is distilled to drive off the benzols and the heavy oil is cooled and returned to the heavy oil scrubbers. The benzols are recovered in the form of a light oil containing usually about 60 per cent of benzol, 12 per cent of toluol and 6 per cent of solvent naphtha, although these percentages vary considerably with the details of the coking process and the light oil recovery.

Before the war the light oil produced was used largely for enriching illuminating gas, and the refined products were employed in the manufacture of paints, varnishes and other similar industries. At that time many plants were not equipped to recover light oil. Since the beginning of the war the enormous demand for the high explosives, picric acid and trinitrotoluol, familiarly known as T. N. T., has resulted in the equipment of practically all the plants in the country for the recovery of these products. It is estimated that the plants now built or building have a capacity of 101,500,000 gallons of light oil per year. For the production of these explosives the benzol and toluol have to be thoroughly refined by washing in sulphuric acid and by accurate fractionation, which processes require skillful supervision. The removal of the light oils from the gas practically destroys its luminosity, but the reduction in calorific value is relatively small.

Trinitrotoluol is very stable and ignites only at high temperatures, and even then it does not explode. It does not freeze, as does nitroglycerine, and on many counts it has advantages on the side of safety and convenience. When used alone it produces large amounts of carbon monoxide; but this can be entirely prevented by combination with other bodies, such as ammonium nitrate for example, if these are added in proper proportion to produce complete combustion.

When the demand for high explosives ceases after the war a large amount of the benzol now produced will probably be sold as motor benzol. This product is usually a mixture of benzol, toluol and solvent naphtha in the proportions in which it occurs in the light oil, and it is obtained by a comparatively simple process of refinement from the light oil. Motor benzol has a fuel value from 18 to 20 per cent higher than gasoline, and may be used alone with the ordinary carburetor if a somewhat larger proportion of air is used, or it may be mixed with gasoline in any proportion. Pure benzol freezes at 5.18 degrees Cent., and toluol at —180 degrees Cent. No trouble is experienced from freezing, even in the coldest weather, when proper percentages of toluol or gasoline are mixed with the benzol.

The dye and color industry in the United States has greatly expanded during the war, and it will flourish after peace has returned if given proper government protection. This will furnish a large market for benzol, which is the raw material for aniline. Also it seems not improbable that trinitrotoluol will be widely utilized as an industrial explosive. It is claimed that it can be manufactured more cheaply than nitroglycerine, and as a commercial explosive it has many advantages over nitroglycerine compounds.

Pulverized Coal in Brazil

The Central Railroad of Brazil recently inaugurated a series of experiments with its new coal-pulverizing plant at Barra do Pirahy, according to the *Commerce Reports*. The pulverizer is described as being similar in construction to a cement plant. The coal, freed of its moisture, passes into a hopper and is pulverized so that 80 per cent of it can pass through a 200-mesh screen. It is then carried to the locomotive by means of a conveyor screw and blast. This brings the ignitable powder to the mouth of the locomotive furnace, at which point combustion takes place. The first set of experiments were with

American coal and were an unqualified success. The experiments were then continued with a mixture and finally with Brazilian coal from the Jacuhy district, until now somewhat problematically useful. This is a coal that does not burn economically in the usual lump form. It was, however, believed that, once pulverized, it would give good results and would prove to be adaptable to the needs of the railroads. The experiment, as reported, was a success and it was hailed as an auspicious event that represents the solution of one of the most vital national problems in Brazil.

Tin Cast Iron Vessels

A method for tinning cast-iron pots and other utensils for domestic use is offered from a French source, *La Chronique Industrielle*. For household utensils only pure tin is employed and not tin and lead, as the latter forms poisonous salts with the acids of food products. To insure adhesion of the tin the iron is treated to remove the carbon, or otherwise it is then polished by mechanical means. To remove the carbon, the iron is coated with a layer of oxide of iron or manganese, or else is enclosed in a box with the oxide and maintained at a high temperature to burn out the carbon. After four to six hours the iron is sufficiently decarbonized to permit the adhesion of the tin. After this procedure the iron is cleaned with dilute sulphuric acid to which is added a small amount of blue vitriol. It is then immersed in molten tin, or, if the interior of the vessel is to be coated, molten tin with a little sal ammoniac is vigorously rubbed over the surface. It is preferable to heat the iron before applying the tin.

Builds Motors for Big Cranes

An interesting announcement was recently made public by the General Electric Co., Schenectady, N. Y., describing the motors installed by that company on some of the huge cranes constructed to speed up with the government's shipping program.

In all, six large capacity cranes were equipped by the company. Two of these cranes are of 225-ton capacity, the total individual motor rating aggregating 420 horsepower.

A third crane, of the same capacity, was equipped with motors with a total intermittent rating of 850 horsepower. The two main hoist motors each had a rating of 250 horsepower for continuous, and 425 horsepower for intermittent service, giving a hoisting speed for 60 tons of 120 feet per minute, and for 225 tons of 40 feet per minute. Due to the high and variable speeds required, the large current demands could not be handled to best advantage through the usual arrangements of rheostats and contactors so a special system of control was provided.

The remaining three cranes are the largest capacity units of this type ever built, being designed to lift 330-ton loads at a rate of 12.6 feet per minute.

In addition to the heavy capacity shipbuilding cranes two high-speed, alternating-current, hammer-head, coal handling gantry cranes have been installed at the plant of the La Belle Iron Works, Steubenville, O. Each unit is equipped with a 375-horsepower, slip ring induction motor direct coupled to a 40-horsepower, direct-current motor, and hoists a 4-ton bucket of coal at a rate of 500 feet per minute. Dynamic braking is obtained by combining the small direct-current motor with the alternating-current motor so that the former serves as an exciter and gives dynamic braking which is comparable with that ordinarily obtained with direct-current motors on this class of work. One of these cranes is shown in the illustration at the foot of the page.

Scottish Engineers Form Joint Association

As a result of the tendency toward engineering co-ordination, and following a series of meetings held in Glasgow a joint committee of the Institution of Engineers and Shipbuilders in Scotland, and the West of Scotland Iron and Steel institute has prepared an outline for a proposed constitution for a new joint association. The new association is to be the Scottish Engineering, Shipbuilding, and Metallurgical Research association. The draft memorandum for the new constitution proposes the following as the objects of the association: To promote research and other scientific work in connection with the trades and industries included within the scope of the association; to apply for and accept grants from the government for the purposes of the association; to establish, form and maintain museums, collections, libraries, etc., and to translate, compile, collect, publish, lend, sell any literature, statistics and information in connection with the trades or industries concerned.

HAMMERHEAD GANTRY CRANE FOR HANDLING COAL AT PLANT OF LA BELLE IRON WORKS, STEUBENVILLE, O.

Making French Shells of Semisteel

Operation of Cupola and Methods of Molding Described—Physical Properties and Actual Firing Tests Prove Best Results Are Obtained From 20 Per Cent Combined Carbon

SINCE the beginning of the war, the capacity of all of the manufacturing plants of France has been taxed to the limit and many new processes have been developed to satisfy the sudden tremendous and insistent demand for all kinds of materials. The foundry industry has been speeded-up and many new applications for cast products have been introduced. The need for ammunition is great and far exceeds what was conceived necessary, even by the most visionary early in the war.

It is a well known fact that five weeks after the declaration of war, the battle of the Marne ended when the French and Germans had practically exhausted their entire supply of shells. It was a tragic and critical moment and all means were exhausted to obtain shells, even though imperfect. It was at this time that practice shells, made of cast iron and containing only a small amount of explosive, were used and these were produced as quickly as the foundries could turn them out. The 75-millimeter (2.96-inch) steel shell gave such an excellent account of itself that every effort was made to secure this projectile in large quantities, and even small shops were awarded contracts to bore and thread steel bars to produce them in two parts, one for the body and one for the cap. This imperfect steel shell and that made of cast iron saved the day for the 75-millimeter rapid fire gun, which was the most important weapon in use at that time. Steps were taken immediately for the manufacture of forged shells on an extensive scale and the output at present is so great that we are furnishing large quantities of them to our Allies.

A different problem was presented in providing shells for the large guns. With the increase in the diameter of the shells, manufacturing difficulties increased proportionately. More time was required to make the large projectiles and to organize for their production in large quantities. It was then that the feasibility of using cast shells was seriously considered.

It is recognized by ordnance experts that the destructive effect of a projectile increases in proportion to its size more rapidly than in the increase in the weight of the explosive it contains. Therefore, steel had the preference for shells in spite of the great cost of the raw material and the high cost of machining. Cast iron shells, used as substitutes for steel, were of small caliber on account of the great thickness of wall it was necessary to provide to insure adequate resistance to the ballistic action of the powder.

The *fonte acieree*, that is cast material and what is known as semisteel, was carefully considered and finally was selected for producing a comparatively cheap, quickly manufactured and reasonably effective shell. The Germans can vouch for this. Since the beginning of 1915, an enormous number of these projectiles, from 80 to 400 millimeters (3.15 to 15.74 inches), have been made and fired for the cause of civilization. In addition to the semisteel shells an enormous tonnage of grenades and projectiles of all kinds have been made of cast iron in France.

The metal required for semisteel shells is defined by the following data, based on the tests made in this country (France) by the ordnance authorities and railroad companies. The test-piece is a square bar, 40 x 40 x 200 millimeters (1.57 x 1.57 x 7.87 inches) long, cast on end in green sand, with a riser. It is tested on two knife supports, spaced 160 millimeters (6.30 inches) apart, by a falling weight of 12 kilograms (26.41 pounds). The initial drop is from a height of 28 centimeters (11 inches) and the weight is raised one centimeter (0.254 inch) after each blow until rupture occurs. The average breaking height must not be less than 45 centimeters (17.71 inches).

The tensile test piece is 18 millimeters (0.71 inch) in diameter x 150 millimeters (5.91 inches) long, cast on end and turned down to 16 millimeters (0.63 inch). The breaking strain must not be less than 25 kilograms per square millimeter (35,558 pounds per square inch).

Hydraulic tests of 10 seconds duration, before banding, are made at a pressure of 300 kilograms per square centimeter (4267 pounds per square inch) for the shells up to 160 millimeters (6.30 inches) and 200 kilograms (2844 pounds per square inch) for the larger sizes. Other tests after banding are made with compressed air or steam at 5 kilograms per square centimeter (75 pounds per square inch).

A reasonable allowance is made for small defects difficult to eliminate entirely in practice, particularly when a great output is required. Small defects are passed externally in front of the band, provided their depth can be determined exactly with a needle and extend into the metal less than one-fourth of the wall thickness.

No defects are permitted at the back of the band except small, interior depressions due to imperfect coring, provided that the thickness of the irregularity is not more than 2 to 3 millimeters (0.079 to 0.118 inch) and that the bottom of the shell is sound.

No definite analysis is required, provided the physical tests are satisfactory. The metal is a low phosphorus, low sulphur and low carbon iron with a sufficiently high silicon content and low percentage of manganese to leave it soft under the conditions of pouring.

Semisteel Shells

This is one of the most noteworthy and timely contributions to the literature of foundry practice since the participation of the United States in the great world war. For several years the Germans and the French have been bombarding each other with semisteel shells, the product of the foundry. Although probably not as satisfactory as steel shells, nevertheless they cost much less, can be produced more quickly and in much greater quantities than steel shells. Furthermore, the supply of steel in all the warring nations is inadequate to the demand, and semisteel, for shell purposes has proved eminently satisfactory. It is also believed that the Germans are casting their semisteel shells in permanent molds by the process devised by Major Edgar Allen Custer.

All of these facts were in the possession of our ordnance department several years ago, but not a semisteel shell for other than target practice has yet been specified. Our steel shells will not meet our needs and semisteel will have to be resorted to.

The way to proceed is pointed out by the author, E. Ronceray, of the firm of Ph. Bonvillain & Ronceray, Paris, France, largest manufacturers of molding machines on the continent. Their foundry is casting semisteel shells by the hundreds of thousands.

This paper was prepared for the American Foundrymen's association and originally was intended for presentation at the Boston meeting of this organization. Owing to the pressure of war business, Mr. Ronceray was unable to complete his manuscript in time for the convention and subsequent mail delays, have made it only recently available for publication.

Typical analyses of semisteel shells, follow:

	Diameter of shell, 120 millimeters (4.74 in.) per cent	Diameter of shell, 155 millimeters (6.11 in.) per cent
Total carbon	3.25	3.06
Silicon	1.35	1.17
Manganese	0.66	0.61
Phosphorus	0.08	0.08
Sulphur	0.10	0.17

To obtain strong metal, it may be melted either in an open-hearth or electric furnace. These processes insure low carbon metal with some degree of certainty; or, cupola and converter metal may be mixed. Thermic treatment will considerably improve the physical qualities. Tensile strengths of 35 to 40 kilograms per square millimeter (47,781 to 56,893 pounds per square inch) have been obtained regularly by these processes. Metal melted by the foregoing processes, however, increases the casting difficulties as it has a tendency to develop blowholes owing to its lack of fluidity. However, for the heavy tonnages required in a short time, the cupola, well handled, gives satisfactory results and regularly produces metal that passes the necessary physical tests. The bulk of the semisteel shells made in France, either for the Allies, or for ourselves, have been cast of cupola metal and therefore, I will limit my discussion to this process.

The standard cupola, as built in America, is capable of producing good semisteel. The tuyeres, usually one or two rows close together in large cupolas, must be of the standard type, that is, flat and one-sixth to one-fourth of the section of the cupola. It is advantageous to employ a cupola, equipped either with a hearth for holding a certain amount of metal, or provided with a receiver. The use of a receiving ladle is not recommended as very hot metal with regularity of composition is essential. If a cupola is employed, equipped with a receiver, provision must be made to heat the vessel white hot before pouring, or the first metal will be dull.

A blower of ample size is required and it is more advisable to have one of too large a capacity than one that must be driven to the limit to provide sufficient blast.

Lining for the Cupola

The best lining is none too good, as all operating conditions are against its long life. The extended heats necessitated by the large outputs required, the exceedingly hot temperatures needed for good metal the large amount of coke burnt at each melt combined with its low quality at the present time and the large amount of limestone generally used, result in the rapid wear of the lining. Owing to the high cost and scarcity of refractory material in France, many foundrymen have adopted sand linings and it must be admitted that in a great many instances these linings have given equal, if not better results than refractory brick. A good, refractory sand is selected for this purpose and it should be rammed hard between the shell of the cupola and a wood form. It is then carefully dried and blacked. In wearing qualities it compares favorably with the best refractory brick. A thick lining, 12 inches or more, is recommended.

The proportion of steel used in the mixture depends on the composition of the initial iron. If low carbon irons are employed, the amount of steel added must be less than if high carbon pig is used in the mixture. As a rule, the hematite irons now available contain more carbon than required, cold blast iron of low carbon content not being produced here in large quantities. Therefore it is necessary to add a large amount of steel to the charges in order to reduce the carbon in the final product. It is generally recognized that steel, before melting in the cupola, absorbs 1.6 to 2 per cent of carbon. Taking this into account, it is easy to calculate how much steel must be added to reduce the carbon percentage to the correct point. In French practice, up to 40 and even 50 per cent of steel is used. The amount generally charged, however, is from 15 to 30 per cent, according to the quality of the initial iron.

Composition of Final Product

The final product varies for different sizes of shells and according to the methods of molding pursued. The shell casting must be softer for the smaller projectile, or more exactly, for the thinner shell, and also it must be softer when the metal is poured in green sand than in dry sand molds. The physical properties of the test bars do not measure the final quality of the product. Therefore, test bars from the projectiles themselves are necessary. Such tests, together with actual firing practice have proved that the best results are obtained when at least 20 per cent of the total carbon is in the combined form, this percentage being as high as consistent with ease of machining. The total carbon is kept at about 3 per cent. Less than 2.75 per cent gives a sluggish metal which is difficult to handle and liable to produce unsound castings. Above 3.25 per cent carbon results in the production of castings that are too weak.

Several methods are practiced for controlling the combined carbon. One is to alter the amount of silicon; another is to change the amount of manganese which seems to act in opposition to the silicon, and a third is to change the rate of cooling. Silicon precipitates carbon in the graphitic form and, consequently, reduces combined carbon; manganese has a reverse action, while combined carbon increases with the speed of cooling.

Since the amount of manganese in the iron and steel we are using is about right, it has not been the practice to vary this element according to the silicon content. The speed of cooling is not easy to control and the only consideration given this factor is in connection with the change that takes place when the thickness of the shell is varied or the adoption of dry or green sand molding methods. Silicon is the element most easily controlled and its manipulation has made semisteel shell manufacture successful in this country. To ascertain the minimum amount of silicon acceptable, a test is made under the usual working conditions of the plant and the shells that are slightly hardened at the point, are analyzed. These will contain the lowest admissible silicon percentage.

Experience has shown that to obtain a sufficiently strong metal, the empirical rule

T. C. + Si = 4.50 per cent must be satisfied.

This is the maximum amount of silicon.

For instance, if total carbon = 2.80 per cent, then

Si = 4.50 — 2.80 = 1.70 per cent.

If total carbon = 3.10 per cent, then

Si = 4.50 — 3.10 = 1.40 per cent.

The amount of silicon must be kept between the limits of 1.40 and 1.70 per cent, the one corresponding to the minimum of silicon giving the maximum resistance permitted without having chilled castings or shells that are too hard, and the other corresponding to the maximum of silicon, above which the castings would be too weak. Care must be exercised to have these figures refer to the final product and, therefore, provision must be made for silicon losses in the cupola.

In working between these limits, analyses made of the actual castings will show that the percentage of combined carbon will be more than 20 per cent of the total carbon necessary to give a satisfactory shell metal. If this figure is not attained, the physical test will not be satisfactory and the shells, when tested will be shattered into small splinters, almost as fine as dust, whereas when 20 per cent or more of combined carbon is obtained, the splinters will be larger and will be more like those of forged steel shells.

Action of Phosphorus and Sulphur

Regarding the other elements, phosphorus and sulphur must be kept as low as possible, but it may be stated that satisfactory shells can be made with as much as 0.15 per cent phosphorus and 0.12 to 0.15 per cent sulphur. Phosphorus reduces the strength, but increases the fluidity. Sulphur is with-

out much effect on the strength, but it reduces the fluidity and retains carbon in the combined form. Its action is counterbalanced by the manganese. Sulphur, however, has a tendency to produce blowholes when the metal is not poured at high temperatures and when the mold is not gated to prevent the entrance of air into the mold with the iron.

Maximum resistance to shock must not be sought, as the tensile strength will not be satisfactory. It must be remembered that a sample giving a high shock resistance will fail in the tensile test, and *vice versa*. A test bar, breaking under a high falling weight, undoubtedly reveals sluggish iron liable to produce blowholes and to chill at thin points. The tensile test probably will not be satisfactory. Under these circumstances, reasonable limits must be fixed in both directions and the rules outlined will enable this result to be obtained.

If a high figure for the falling test and a low tensile test are obtained, silicon must be added.

If the tensile test is high and the falling test too low, carbon must be reduced.

Steel and ferrosilicon, or high silicon iron are the two agents that will best serve the metallurgist, care being exercised to take into account possible variations in the initial metals used.

Analyses and Rapid Tests

It is helpful, of course, to analyze the initial and final products. Though it is difficult to rely entirely upon the regularity of the materials received, it must be admitted that analyses, properly made, are important. All materials should be analyzed, especially iron, scrap, coke, limestone, sand, core oil and the finished castings. After a short time these analyses will provide a certain amount of fixed data which will enable the metallurgist to handle, with a greater degree of certainty the factors that are liable to change from day to day. For instance, phosphorus, sulphur and manganese will remain about the same for each brand of iron, sulphur for each brand of coke, and limestone and sand do not vary much if received from one source. Silicon loss and carbon gain in the cupola will not change much if the same practice is followed every day.

Other factors, on the other hand, are liable to constant changes; these include silicon in pig metal, moisture in the sand, composition of the core oil, etc. Therefore, analyses must be made as frequently as seems necessary under the circumstances, always keeping in mind that *it is a practical impossibility to work only from analyses,* particularly *on account of the irregularity of the materials used.* In fact, it may happen that the samples analyzed do not represent the average analysis of a car lot, or that a few pigs in the car are entirely different from the balance; also, steel scrap varies in composition, etc. It also must be remembered that if a mistake is made, the analysis of the final product will point out the corrective measures that must be adopted.

Either Keep's or a chill test should be made constantly to determine roughly if the amount of silicon is right. If not, the iron may be pigged and a part of the loss recovered, or the iron can be improved by additions in the ladle, or changes in the subsequent cupola charges. It is the prevailing practice to add powdered ferrosilicon in the ladle when the iron is too hard.

It also may be necessary, when the product is irregular in composition, to pig a certain amount of metal; for instance, to prepare a low carbon metal from hematite iron and a large percentage of steel, to use in place of scrap. If this metal is analyzed it renders more certain obtaining a satisfactory final product. Some firms knowingly increase their foundry scrap of known composition by making the risers much larger than really necessary. These precautions increase the quality of the product, but at a heavy expense in time and money, and they only must be resorted to when all other means have failed.

A useful, rapid test consists of taking a sample of metal every half hour and pouring it against a chill. The sample is plunged into water when set and is broken immediately. An experienced eye can tell quickly the depth of chill that gives the right metal for the needs of the foundry. This depth is not the same for all classes of shells; it must be less for small or thin projectiles, than for heavy ones. I prefer this to another test recommended by the ordnance department which consists of pouring cones into open sand molds from time to time, and after cooling, the points are broken off for the purpose of ascertaining from the fracture if the metal is right.

The operation of the cupola is similar to that for ordinary work. However, the amount of coke used is somewhat more than the average, but not so much as might be imagined. It is generally from 12 to 15 per cent of the charges and this is necessary on account of the necessity of having metal much hotter than is obtained usually if sound castings are to be made. It must be borne in mind that a blowhole which would be unimportant in a machinery casting would not be passed in a shell. Also, it must be remembered that a certain amount of carbon is absorbed by the steel charged before it melts. Some foundries are using up to 20 per cent coke, but the writer considers this bad practice, as satisfactory results are obtained with a smaller amount. However, in spite of the high price of coke, foundries must not be tempted to reduce its consumption to less than what is necessary to obtain the best results. Good shells only are obtained when the temperature of the iron at the cupola spout is about 1450 degrees Cent. and it must never be less than 1250 degrees Cent. when entering the mold. Unfortunately, there are few practical methods, of readily measuring the temperature of a stream of iron.

In charging the cupola, the rules defined by Richard Moldenke may be followed. However, it has been found that better results have been obtained by increasing both coke and iron charges by 50 to 100 per cent over what he recommends. That means that coke charges are 6 to 8 inches high.

Different methods are followed for charging limestone and there is no agreement in the amount used. With the poor grade of coke now supplied in this country, containing from 16 to 18 per cent of ash, some foundries use up to 12 per cent limestone and add it to all charges including the bed. This means that charging 12 per cent coke, as much limestone as coke is used.

The pig iron should be broken into small pieces, but it is still more important to use steel in small, rather than large pieces, as the action of cementation which takes place before liquefaction, takes some time and would not be completed if the pieces are too large.

Tin Imports Rise

Imports of tin into the United States during the calendar year 1917 showed a slight increase notwithstanding the difficulties experienced by American importers in getting foreign export licenses and the fact that the importation of this metal is controlled by the government. Including the approximate content of imported ore, but not including Alaskan ore, the total imports of tin in 1917 amounted to 68,996 long tons against 66,624 tons in 1916, according to figures by the bureau of foreign and domestic commerce, department of commerce. Of 1916 imports 49,415 tons, or 74 per cent, came from England and the Straits Settlements, whereas in 1917 only 41,463 tons, or 60 per cent, came from these two source. Imports from the Dutch East Indies increased to 14,148 tons, or 20 per cent, of the total, Australia, China and Bolivia supplying most of the remaining 20 per cent. A large part of our Straits tin imports came by way of England as usual, but it is expected that the present year will witness an increase in direct shipments.

Brittleness in Electroplated Steel

A Review of Experiments Showing the Relation of Hydrogen to the Characteristics of Iron and Steel—Recent Tests Indicate That Tin-Dipping Before Plating or Pickling Prevents Embrittlement

BY T. S. FULLER

ONE of the serious problems which confronts the makers and users of noncorroding steel springs is the brittleness produced during electroplating. The embrittlement is generally conceded to be caused by the nascent or atomic hydrogen which is liberated at the cathode, although several investigators conclude from their experiments that hydrogen is not the cause of this trouble.

The cooling curve of the hydrogen-iron alloys shows the existence of two distinct evolutions of heat, which occur at about 487 and 261 degrees Cent. It is remarkable that repeated heatings and coolings of low-carbon and electrodeposited iron in vacuo reduce the magnitude of all the now well-known molecular changes—*Ar* 1, *Ar* 2, *Ar* 3, as indicated on the cooling curves. The exhausted electroiron may be recharged with electrolytic hydrogen, by making it the negative electrode of a cell decomposing acidulated water. If the recharged iron be heated in vacuo, as already described, it will be found that the evolutions of heat in cooling, and consequently the points on the curves, will be restored to their original magnitude.

Heyn found that iron heated above 730 degrees Cent. in hydrogen and then quenched in water or in mercury became brittle.

Wedding discusses in detail the relations of iron and hydrogen and develops the theory that the two elements form unstable alloys. The fact that iron takes up nascent hydrogen at low temperatures and is made very brittle thereby, was developed by a number of investigators about 1870-80. Numerous researches showed that the flexibility and elasticity of iron wire and steel springs were greatly decreased by pickling, and the effect is the more marked, the thinner the material. Electrolytic iron may contain nearly 250 times its volume of hydrogen, while the commercial iron averages only 0.5 its volume.

Table I

Effect of Copper-Plating

		Breaking strength, pounds
1.	Untreated	433
2.	Untreated	438
3.	Untreated	435
4.	Untreated	374
5.	Untreated	439
6.	Untreated	418
7.	Untreated	310
8.	Copper plated	69
9.	Copper plated	137
10.	Pickled 20% H_2SO_4—3 min.	198
11.	Pickled 20% H_2SO_4—1 hr.	29
12.	Pickled Sn dipped	38
13.	Pickled Sn dipped	32
14.	Pickled Sn dipped Cu plated	22
15.	Pickled Sn dipped Cu plated	34
16.	Sn dipped (rosin) Cu plated.	300
17.	Sn dipped (rosin) Cu plated.	352
18.	Sand blasted, Sn dipped (rosin) Cu plated	390
19.	Sand blasted, Sn dipped (rosin) Cu plated	318
20.	Sand blasted, Sn dipped (rosin) Cu plated	417
21.	Sand blasted, Sn dipped (rosin) Cu plated	356
22.	Sand blasted, Sn dipped (rosin) Cu plated	410
23.	Sand blasted, Sn dipped (rosin) Cu plated	402

Burgess and Engle found that unheated electrolytic iron dissolved in normal sulphuric and hydrochloric acid almost twice as rapidly by weight as commercial zinc. After heating to 1000 degrees Cent. and cooling slowly, the rate of solution became as low as the least corroded form of iron tested, that is, transformer iron.

Richards and Behr found that nascent hydrogen is more readily absorbed by iron than is gas. They mention earlier observations of the same thing: "Cailletet and Johnson showed in 1875 that iron will take up at ordinary temperatures electrolytic hydrogen deposited upon it, while ordinary gaseous hydrogen has no effect. Johnson's work was particularly interesting. His iron was in the form of soft wire and his simple method of testing for hydrogen was to bend the wire to test its brittleness, since he had discovered the interesting fact that hydrogen imparted this property to iron previously tough. Immersing the wire in acids which react on it to form hydrogen uniformly made it brittle. Making the wire the cathode in neutral, acid, or alkaline solutions had the same effect, but iron anodes were unaffected even in the acid solution. Other wires were placed in a bottle full of water, and hydrogen was made to bubble violently through the water, without any trace of absorption." The occluded hydrogen is slowly

A paper presented at the thirty-second general meeting of the American Electrochemical society, Pittsburgh. The author, T. S. Fuller, is affiliated with the research laboratory, General Electric Co., Schenectady, N. Y.

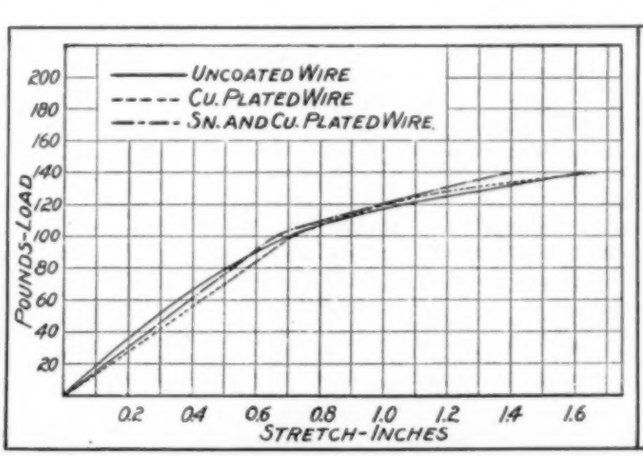


FIG. 1—RELATION OF STRETCH TO LOAD

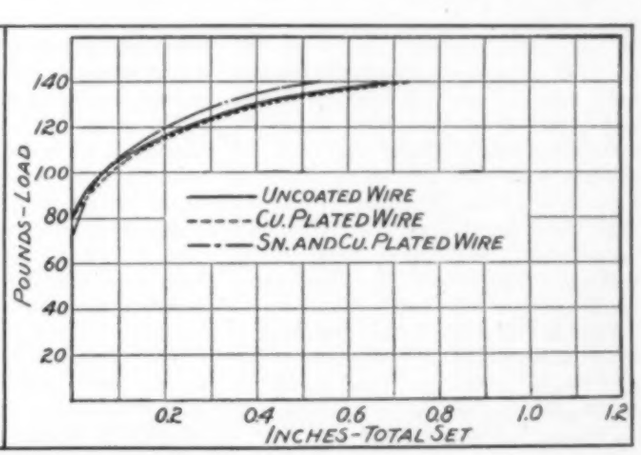


FIG. 2—RELATION OF PERMANENT SET TO LOAD

given off, upon exposure to the air, a little more rapidly in pure water and quickly in ferrous sulphate. The active hydrogen raises the single potential of iron by as much as 0.15 volt, although hydrogen gas has a lower potential than iron.

Reduction During Melting

Burgess says: "Among the properties of electrolytic iron which may give it some added usefulness is its content of hydrogen and the brittleness which results from this occluded gas. This hydrogen may be of some service in reducing oxide in a melt. The brittleness of the electrolytic iron before the hydrogen is driven off makes it easy to break it into pieces suitable for introduction into the steel crucibles."

Charpy and Bonnerot have observed that iron at ordinary temperatures acts as a membrane, permeable to nascent but not to molecular hydrogen. This was observed by experiment with hydrogen liberated from attack of acid on the iron membrane, and also by making the latter cathode solution. Osmosis occurs only when the hydrogen is liberated directly upon the membrane. Pressures as high as 14 atmospheres have been produced by such osmosis into a closed chamber.

Andrew concludes from experiments upon iron and caustic soda that hydrogen, upon being occluded by iron, immediately gives rise to the production of large crystals and brittleness. "It is not contended that hydrogen *per se* is the cause of the crystallization, but rather that it is due to the evolution or occlusion of hydrogen effecting a molecular disturbance.

"Iron gives up the greater part of its hydrogen as the temperature passes through that of the critical stage."

Effect of Stress

He quotes Stromeyer to the effect that contact with cold caustic soda of a concentration of over 90 or 100 degrees Twaddell causes mild steel to become brittle. Tubes and plates crack and rivet heads fly off. This takes place even out of contact with the air where there is little corrosion. Stromeyer states that this brittleness and corrosion occur only when the metal is in tension. Unstressed or compressed metal is not affected.

Guillet mentions that electrolytic iron as deposited is extremely brittle and hard, "due to the occluded hydrogen, and probably also, as will be seen, to interstrain."

Storey found that the extremely brittle and soluble electrolytic iron, heated to between 500 and 600 degrees Cent. gave off a large amount of hydrogen and became ductile and more resistant to acid without undergoing any apparent change in crystalline structure.

Baraduc-Muller conducted preliminary experiments on the gases contained in liquid steel. Ingots were melted and the gases pumped off and analyzed. In one case the gas amounted to 54.2 per cent by volume of the metal. Hydrogen was the principal constituent. The mechanical properties were improved by removal of the gas.

Table II

Results of Dissimilar Tests

No. 24—Untreated

Diameter of wire, in.	0.117
Mean diameter of spring, in.	0.773
Number of turns	5.000

Load, pounds	Stretch, inches	Total set, inches
000	0.000	0.000
20	0.078	0.000
40	0.250	0.000
60	0.344	0.000
80	0.516	0.000
100	0.703	0.062
120	1.062	0.234
140	1.625	0.687

No. 25—Copper-Plated

Diameter of wire, in.	0.120
Mean diameter of spring, in.	0.782
Number of turns	5.000

Load, pounds	Stretch, inches	Total set, inches
000	0.000	0.000
20	0.125	0.000
40	0.312	0.000
60	0.453	0.000
80	0.578	0.000
100	0.703	0.078
120	1.031	0.234
140	1.656	0.734

No. 26—Tin-Coated (Rosin) Copper-Plated

Diameter of wire, in.	0.123
Mean diameter of spring, in.	0.779
Number of turns	5.000

Load, pounds	Stretch, inches	Total set, inches
000	0.000	0.000
20	0.156	0.000
40	0.281	0.000
60	0.406	0.000
80	0.531	0.0156
100	0.656	0.0625
120	0.984	0.2187
140	1.406	0.5312

Parr has studied the embrittling action of sodium hydroxide on soft steel, and he concludes: "The evidence seems to show that the embrittling effect of sodium hydroxide on steel is due to the evolution of hydrogen and the absorption by the steel of the hydrogen in the nascent state."

The experiments described in this article were made to find, if possible, a means of preventing the brittleness of electroplated steel springs. All the test samples were made from the same lot of black spring wire 0.120-inch in diameter. Eight or ten turns of the wire were wound on a ⅛-inch mandrel and 3-inch lengths left on both ends of the spring to fit into the grips of the testing machine. This necessitated a sharp bend at both ends of the coil and it was at one of these bends where the break usually occurred. The breaking strength as determined by an Olsen testing machine proved to be the best criterion for comparing the springs treated in different ways.

Effect of Copper-Plating

The breaking strength of seven untreated test springs (1-7, Table I) was determined. Five of the seven samples broke above 400 pounds, the values ranging, however, between 310 and 439 pounds.

Two like springs were made cathode for one-half hour in a cyanide copper solution. These (No. 8 and No. 9, Table I) broke at 69 and 137 pounds, the treatment in the copper plating solution having cut down the breaking strength to 17 and 35 per cent, respectively, of the average value of the seven untreated springs. Furthermore, the copper-plated samples stretched to two or three times their original lengths.

Test spring No. 10 (Table I) was pickled for three minutes and No. 11 (Table I) for one hour, in 20 per cent H_2SO_4 solution. The former sample broke at 198 pounds, showing a reduction in strength to 50 per cent of the untreated value; the latter broke at 29 pounds, with a reduction in strength to 7 per cent of the untreated value. The latter sample was reduced 0.001 inch in diameter by solution in the acid.

Effect of Tin in Preventing Brittleness

It was then thought that a coating of tin on the steel might prove to be impervious to the action of the atomic hydrogen, and thus allow the spring to be copper-plated without impairing its mechanical properties. This was found to be true. The first test samples which were tin-dipped, however, were pickled for a few seconds in H_2SO_4 previous to the dipping. These (12 and 13, Table I) showed breaking strengths of only 38 and 32 pounds. Nos. 14 and 15, which were pickled, tin dipped and copper-plated, showed breaking strengths of 22 and 34 pounds. The very poor results obtained from these four samples, however, were due to the H_2SO_4 pickle which they received before dipping.

Two samples (16 and 17, Table I), without having been pickled, were

dipped directly into rosin and then into molten tin heated to a temperature of 260 to 300 degrees Cent. These springs broke at 300 and 352 pounds or in the neighborhood of the range of the untreated springs (310-439 pounds).

Samples 18, 19, 20, 21, 22 and 23 (Table I) were sand-blasted, dipped in rosin and molten tin, and copper-plated in the same solution used for the copper-plated springs previously described. These samples showed breaking strength from 318 to 417 pounds, all of which are well within the range of the values for the untreated springs.

The mechanical properties of the samples were not appreciably changed by the tin treatment. Table II shows the results of tests made on three similar, but differently treated springs, made from the same lot of wire as those previously described, but wound on a ½-inch instead of a ⅛-inch mandrel. No. 24 was untreated; 25, copper-plated, and 26, tin-dipped (rosin) and copper-plated. For the same load, all three springs show approximately the same stretch and total set, as may be noted from the plotted results of these tests.

The three curves in Fig. 1 show graphically the relation of the stretch to the load for springs 24, 25 and 26, plotted from data in Table II. Fig. 2 shows the relation of the permanent set to the load for the same springs. The variation is slight.

The facts are all in accord with the assumption that the absorption by the steel of atomic or nascent hydrogen liberated at the cathode is the cause of the embrittlement of steel springs in the plating bath. This embrittlement may be prevented by first dipping the springs in a bath of molten tin. The tin forms a coating on the steel which is impermeable to atomic hydrogen. Rosin may be used as a flux in the tin-dipping. The springs may be sand-blasted, but must not be pickled in acid. Steel springs may be dipped in molten tin at a temperature of 260 to 300 degrees Cent. without appreciably changing their mechanical properties.

Urge Standardized Steel Mill Motors

DESIGN, selection and standardization of steel motors were discussed at a joint meeting of the Cleveland, Pittsburgh, Toledo, Toronto and Detroit sections of the American Institute of Electrical Engineers with the Association of Iron and Steel Electrical Engineers held at the Hotel Statler, Cleveland, on March 8. W. T. Snyder, National Tube Co., McKeesport, Pa., presented a report from the standardization committee in the form of a paper urging the value of standardization of steel mill and auxiliary motors in promoting economy and continuous operation. He stated that because there is no basis of agreement on motor design there are over a million motors in use in the iron and steel industry which require 500,000 armature changes a year and 20,000 spares. This requires a constant investment of over $80,000,000 in spares. This latter amount could be reduced to $20,000,000 if motors were standardized so that parts were interchangeable and emergency motors might be substituted while repairs were made.

The appeal for standardization met with favor from the members present. T. E. Tynes, Lackawanna Steel Co., Lackawanna, N. Y., stated that the need is shown in their plant by the fact that the 19 types of direct current motors in use require 54 separate windings, armatures, brush holders, etc. Further the five types of alternating current motors in use in the company's works require 25 different kinds of repair parts. The greatest difficulty was stated to be in crane motors which require a maximum of rebuilding and improvising in event that the type of motor is changed. D. M. Petty, Bethlehem, Steel Co., South Bethlehem, Pa., stated that the three plants of the company had managed to concentrate on three types of motors, one type for each plant, but the present demands had necessitated mixing them, and they had realized the value of the approximate standardization which had previously existed. He stated that standardization, contrary to the belief of many would result in better design and efficiency. He cited the high development of the incandescent lamp as an example.

Mill Transmission Considered

A paper entitled, Design of Underground Distribution for Electric Light and Power, by George J. Newton did not concern steel mill practice primarily, but in the discussion which followed the problems of steel mill power transmission were outlined. E. Friedlaender, superintendent of the electrical department, Carnegie Steel Co., Braddock, Pa., stated that more study was needed on the subject of insulation. Heat pipes, steam lines, underground water and oil are all enemies of power line insulation when the cables are pulled through underground ducts, as is demanded by the best modern practice. If open manholes are provided there is danger of hot metal or cinder getting into them and destroying the lines. Without manholes there is difficulty with gas, and repairs are more difficult.

A paper on "Some Considerations in Determining the Capacity of Rolling-Mill Motors," by Robert F. Hamilton, represented a detailed consideration of electric drive for rolling mills in Great Britain. A mathematical development of motor and flywheel design was given.

J. D. Wright, electrical engineer, General Electric Co., Schenectady, N. Y., presented a paper on the selection of auxiliary motors with special reference to side guards, manipulator fingers, tilting and inspection tables. A series of slides demonstrated the features of electric drive for these units and outlined the considerations which governed the selection of motors and control devices. In the discussion which followed, Mr. Friedlaender called attention to the need for counter weights on the roll tables, particularly those of 50 tons or more in weight. He also stated that the full reversing type of motor should be used for raising and lowering the approach tables and for controlling the side guards which line the billets into the roll slots, as both of these are "inching" operations. G. W. Richardson, American Bridge Co., Pencoyd, Pa., suggested that the side guards should have brakes for the reasons suggested by Mr. Friedlaender involving the "inching" operations, but that a full crank revolution was satisfactory in raising and lowering the manipulator fingers to turn the material on the tables. A. E. Menk, Carnegie Steel Co., Homestead Works, Munhall, Pa., suggested the balancing of a tilting table at the center to save part of the energy required to lift the table entirely from one side as is the present practice.

Will Make Ferro

The Anaconda Copper Mining Co., Butte, Mont., will start work immediately on the construction of a plant at the Boston and Montana works at Great Falls, Mont., for electrolytic production of ferromanganese. This is in response to an appeal from the war industries board to Presdent John D. Ryan. Five furnaces will be installed, each capable of handling 250 tons of ore daily. Ore will come from Anaconda's Butte mines and from custom product. Electric power will be furnished by the Montana Power Co.

Strikes Made Conspiracy

House Passes Bill Which Penalizes Blocking of War Industries—Nation to Aid Workmen

CALCULATED to bring to an end all wage profiteering, an administration bill has passed the house which declares that all strikes called to obstruct war industries are conspiracies. Offenders are subject to 30 years' imprisonment and fine. While Representative Cannon, of Illinois, made an effort to prohibit all war industries strikes, "in order to provide a weapon against the I. W. W." he said, his amendment was defeated and the labor forces inserted an amendment, urged by Representative Lunn, of New York, which specifically permits bona fide strikes to raise wages or better working conditions.

However, since it is the present intention of Washington officials to bring labor more and more under government supervision and protection, it is thought that there is nothing to fear from that direction. Perhaps no one other question is receiving so much attention in Washington right now and it is intended to make conditions of work and wages the best possible for the workingmen. Union labor officials will be asked to play an important part in the war program, and an important official on the shipping board recently predicted that as a result of the way these matters will be handled from this time forward, ship production will speed up in the next four months to an astonishing degree.

Because of these facts, it is believed that nothing is to be feared from the threat of William L. Hutcheson, president of the carpenters and joiners, to appeal to the President, and that failing he will not be responsible for the result. It is expected that if Mr. Hutcheson does appeal to the President, he will be referred back to the wage adjustment board of the shipping board, which now is endeavoring to bring about general agreements with all classes of labor that will insure no abatement of work in the highly important shipbuilding program.

Labor Committee Complete

Associate Supreme Court Justice Louis D. Brandeis has been named general public representative by the five heads of labor organizations, who with five representatives of employers are holding sessions in Washington to frame the basis of a national labor policy for the duration of the war. The employers selected Ex-president William Howard Taft as representative of the general public, making 12 in all on this committee. William Johnson, Washington, head of the machinists' union, was chosen to succeed J. A. Franklin, Kansas City, president of the boilermakers' brotherhood, who was unable to serve on the committee. Mr. Franklin has been appointed by Director General McAdoo as assistant director of the railroad administration's division of labor. He will assist in negotiations with shop trades.

Ship Plants in Speed Contest for Wager

Joseph W. Powell, vice president of the Bethlehem Shipbuilding Corp., Ltd., is authority for the statement that the employes of the Union Iron Works, San Francisco, the great Bethlehem yard on the Pacific coast, have made a wager of $10,000 with the employes of the Fore River branch of the corporation, Quincy, Mass., that they will turn out more destroyers for the navy during 1918 than will the Quincy yards and that the money will go to the city with the better launching record. The Union Iron Works has broken all world's records for quick construction of merchant vessels, while at Fore River it has the world's records, so far as is known, for speed in building a destroyer. The men at the Fore River yards are so confident of winning that they increased the original wager from $5000 to $10,000, employes of the Squantum, Mass., Providence, R. I., and Buffalo branches having joined in with them.

Industrial Situation is Showing Improvement

Recent wage adjustments and other conciliatory measures adopted to prevent tie-ups, walk-outs, etc., back up Secretary of Labor Wilson's statement of a few days ago that the industrial situation in the United States is now in a better state than at any time before the war. Only 17 of the 74 labor disputes before the adjustment board have reached the strike stage. In the first 11 months of the United States' participation in the war, 807 disputes were handled by the department of labor, and these involved 1,200,000 men directly. Conciliation methods settled 509, while the number where the conciliation commission was unsuccessful averaged six cases a month.

A misunderstanding of orders to former Admiral Bowles almost brought a strike at the Hog Island shipyard. It was averted when explanations were made that double time would be paid for overtime instead of time and a half. Employed on boats in New York harbor, 60,000 workmen recently threatened to strike but following a conference of W. B. Squires, acting secretary of the United States board of arbitration with boat owners, agreed to await developments. This department was recently called into conference with 1900 machinists at the Saco-Lowell shops, Lowell, Mass., whose strike was averted by a wage increase of 3 cents an hour. Good work was also done by this board at the plant of the Liberty Ordnance Co., Bridgeport, Conn., where the men walked out following the discharge of a fellow-workman. Overtime beyond eight hours will be paid at the rate of time and a half and Sundays will bring double pay. The men will be told the reasons when they are discharged.

Machinists and their helpers at the Fore River and Squantum, Mass., plants of the Bethlehem Shipbuilding Corp., Ltd., have organized. They will formally present their demands to the United States shipping board at a coming conference in Washington. The men favor the 3-shift plan, and the schedule demanded is as follows: Journeymen machinists, $6 per 8-hour day; helpers, $4.50 per 8-hour day, five days a week and four hours on Saturdays; double time for overtime work, and night workers to be paid 10 per cent increase over the day rate.

Skilled Men Needed

Immediate requirements of the signal corps of the aviation section of the United States army inspire a call for 10,000 skilled machinists, mechanics, chauffeurs, etc. Although the strength of this service is 100 per cent greater than on April 1, 1917, this call is but the precursor of others for the great air army, since 46 men are needed on the ground for each man in the air. Out of every 100 in the service, 98 must be skilled in some

branch of work. Draftees may be inducted into the aviation service by applying to their local draft boards. Men not registered may enlist at any recruiting office. Further information will be supplied by the air division, personal department, Washington, D. C. The field is open for auto mechanics, engine repairmen, gun, tin, copper and blacksmiths, electricians, carpenters, sheet metal workers, wireless operators, tailors, tent and sail makers, vulcanizers, welders, etc.

Electric Process

Of Iron and Steel Making Expands Markedly in Canada

Production of pig iron in Canada last year was approximately 1,172,000 short tons as against 1,169,000 short tons for the year 1916, according to a preliminary report on mineral production in 1917 by John McLeish, chief of the division of mineral resources and statistics, was recently published by the Canadian mines branch. Only 1,157,000 tons of the 1917 figure, however, were produced in blast furnaces, the remaining 15,000 tons being remelted pig iron or reclaimed scrap, produced in electric furnaces. Thus the production of virgin pig iron in 1916 really exceeded that of 1917, as few electric furnaces were employed in Canada in the former year. The total shipments of iron ores from Canadian mines during 1917 were 215,242 short tons, as compared with shipments of 275,175 tons in 1916. Of this amount 197,602 tons consisted of hematite, and roasted hematite and siderite, the remaining 18,000 tons being magnetite and titaniferous ores. As in the past, the Helen and Magpie mines of the Algoma Steel Corp. were the chief producers.

The estimated production of steel ingots and direct steel castings was 1,737,000 short tons of which 1,690,170 tons were ingots and 46,344 tons were direct steel castings. This is a material increase over the 1916 production which approximated 1,428,000 tons. The total production of electric steel in 1917 was probably not less than 50,000 tons as against 20,000 tons in 1916 and 6000 tons in 1915.

Copper production aggregated 108,860,358 pounds as against 117,150,028 pounds, in 1916. Of the total, 86,509,000 pounds were contained in blister copper and in matte produced in Canada, and 22,352,000 pounds were estimated to have been recovered from exported ores. Nickel output was derived almost entirely from the ores of the Sudbury district supplemented by a small quantity from the silver-cobalt-nickel ores of the Cobalt district. Production was 84,471,000 pounds compared with 82,959,000 pounds in 1916.

Vast Magnitude

Of Canada's War Industry Shown—United States Orders Outlined

Toronto, March 9.—Hon. Newton W. Rowell, president of the Canadian privy council, speaking before the Toronto Y. M. C. A., stated that the imperial munitions board had placed orders in Canada for $1,100,000,000 worth of munitions, and that a sum of $875,000,000 already had been expended in respect of these orders in plants established in every province with the exception of Prince Edward Island. There were between 500 and 600 plants engaged in making munitions, employing between 250,000 and 300,000 workers, including at one time as many as 35,000 women. The number of women now engaged in munition work is about 5000. Canada had machined over 53,000,000 shells, 40,000,000 brass cartridge cases of 3½ pounds each, and 58,000,000 copper bands. It is now rendering assistance to the United States, being engaged on orders for 7,000,000 shells, 10,000,000 forgings and 2,000,000 cartridges for the latter government. The sum of $10,000,000 had been spent in aeroplane plants and aerodromes in Canada and 1000 high-grade aeroplane engines are at present being constructed.

The first steel for the four ships to be constructed for the British government at the yards of the Canadian Allis-Chalmers, Ltd., near Bridgeburg, Ont., has been received, and the machinery of the plant is being installed. A force of about 4000 men will be employed. The vessels will be built simultaneously and it is expected that they will be completed this year.

The Ontario government has appropriated $9,054,951 for expenditure on capital account this year by the provincial hydroelectric power commission. The principal items are as follows: Chippewa Creek, development, $4,175,000; Niagara system extensions, $2,865,000; Central Ontario system extensions, $588,000; Severn system, $405,000; Eugenia Falls system, $233,000; and St. Lawrence system, $251,000.

The sum of $100,000 has been appropriated to carry on an extensive investigation into the possibility of developing the peat resources of the province, so as to furnish a substitute for coal. The government has engaged the best expert available in England, who is at work investigating new methods of peat fuel manufacture.

Obituaries

HENRY GRAHAM BROWN, aged 65, vice president and general manager of Brown & Co., Inc., Pittsburgh, manufacturers of merchant iron bars and crucible tool steel, died recently while being taken to Allegheny General hospital, after being stricken with heart failure in Sixth street, Pittsburgh. Mr. Brown was born in 1853, was graduated from Haverford college and came to Pittsburgh 40 years ago. He entered the employ of his father, John H. Brown, who was a member of John H. Brown & Co., steel manufacturers. Later he, with his brother, J. Stuart Brown, and James Neale, took over the business and incorporated it under its present name. He was also vice president of the Clyde Coal Co., and of the Pennsylvania Drop Forging Co.

James Miller Hustead, familiarly known as Captain Hustead, president of the Hustead-Semans Coal & Coke Co., Uniontown, Pa., died recently in Clearwater, Fla. He was born in Smithfield, Pa., Sept. 18, 1827. For the past year or so he had suffered poor health and this winter he journeyed to Florida to recuperate.

H. M. Hollister, aged 80 years, who three years ago retired from a 35-year service with the Fairbanks-Morse Co., Chicago, died recently at his home in Oak Park, Chicago.

George England, aged 68, who for 16 years has been superintendent of the Edgar Thompson Steel Works, Carnegie Steel Co., Braddock, Pa., died recently in that city.

Samuel Farquhar, president of John Farquhar Sons, Inc., Boston, one of the oldest roofing and sheet metal concerns in the country, died at his home in Newton, Mass., recently, after a brief illness. He was born in Boston 76 years ago and after receiving his education, he entered the firm which his father founded and which now is being conducted by his son Frank C. Farquhar. Samuel Farquhar was identified with John Farquhar Sons, Inc., for over 50 years.

Virginia Iron Activity Running High

More Furnaces Now Operating Than at Any Time in History—Two Stacks Making Ferromanganese and Another About to Start—Control of Lynchburg Plant Passes to Lavino Interests of Philadelphia

(Special Correspondence)

ROANOKE, Va., March 11.—Of the 20 furnaces in Virginia 80 per cent are operating at the present time, only four being out of blast for one reason or another. Never before in the history of the iron industry in this state have there been 16 furnaces operating at the same time. The four furnaces out of blast are all controlled by various operating companies and are not available as a means of increasing production. Where one of these would be operated some other furnace would be banked or blown out for repairs so that it may be said that the Virginia production, as far as furnaces operating are concerned, has reached its capacity. This is not true as to tonnage, however. Practically every furnace is having trouble with its operation as the result of shortage and poor quality of coke, uncertain labor conditions and severe winter weather.

The two principal railroads serving the furnaces here, the Norfolk & Western and the Chesapeake & Ohio, are handling the business on their own lines in excellent shape, but are badly tied up by embargoes necessitated by the congestion of connecting lines. The Norfolk & Western is showing the result of its superior management, in comparison with the other roads in this field, by moving iron more regularly and in larger quantities than any other road. The Chesapeake & Ohio furnaces are badly congested and practically every plant on that road is accumulating a large stock of iron, all of which is sold and badly needed by customers but cannot be shipped, due to embargoes. Never before has the value of a well conducted traffic department been made so manifest as in the last six months. The two furnace companies in the state equipped with good traffic managers have been able to ship throughout the winter and have little or no iron on their yards tied up by embargoes.

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The Allegheny Ore & Iron Co. has both furnaces in blast although the Buena Vista furnace has been banked intermittently all winter, due to the lack of coke. The Iron Gate furnace is running steadily but being located on the Chesapeake & Ohio exclusively has accumulated a large stock of iron which cannot be shipped. This furnace owes a considerable tonnage of coke to a neighboring furnace which is clamoring for its return and it is rumored that it may be necessary to bank Iron Gate temporarily in order to return this coke. This company is well sold up for the first half but is temporarily out of the market for the second half, due to uncertainty as to whether the steel interests in Pennsylvania, which control the company, will find it necessary to make basic for their own plant because of their inability to purchase iron in the Pennsylvania field.

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The Southwestern Iron Co., whose property in Virginia was formerly called the Goshen furnace, is operating on ferromanganese. This furnace, controlled by Chicago interests, went into blast early last fall and despite the series of unexpected difficulties

Banker's Farsightedness Outdoes Iron Makers' Experience

THE story of the accomplishments of the Princess furnace during the last two years would make a business story of absorbing interest akin almost to romance. This little furnace of 90 tons daily capacity, located on the James river a few miles south of Clifton Forge, was one of the properties owned by a well known iron interest of Philadelphia and Cincinnati. Having gotten their owners into financial difficulties during the depression following 1914, this furnace with other properties was assigned as security to a certain bank in Cincinnati. It is a well known maxim of the pig iron business that during periods of activity the man who makes the best showng in pig iron is the man who knows the least about the business. Since the president of this bank, a shrewd and far-seeing financier, did not know the least thing about the pig iron business, it was a foregone conclusion that he could make a lot of money by operating the property. And that is exactly what he did.

In August, 1915, he started operating and piling his entire make. He authorized several established brokers to sell his iron but kept his price about $2 higher than the market, advancing it promptly as the market advanced. When, in the early winter of 1916, pig iron rose to $18.50 and slumped off to about $17.50 and everyone else was selling ahead as far as they could persuade customers to make contracts, this furnace increased its authorized price to $25 and kept on stocking iron. When iron reached $25 in the spring of 1917, the Princess price was $30, although the company did condescend to accept mail orders around this figure. sumers were scrambling for tonnage and the price was close to the $50 mark, this furnace was found to be in the enviable position of having 50,000 tons of iron on hand available for sale, and as fast as it could be loaded and shipped it was converted into money. By the end of 1917, this little furnace which had only been able to make a reasonable profit when operated by experienced iron interests, had paid off the entire debts and obligations of its former owners and had released both itself and the other properties entrusted to the bank for security. It is said that profits realized from this operation were in excess of $1,250,000.

A good many of its competitors, who were busy predicting catastrophe to the daring Cincinnati banker, still are figuring on how much longer it is going to take them to clean up their $15 and $18 orders. Today the furnace is back in the hands of its original owners and undoubtedly again is making a reasonable profit, with every indication of continuing to do so.

encountered at first, it has made a satisfactory record on ferromanganese. It is a common report that $150,000 was spent in rebuilding this furnace, although that statement has never been verified by the owners.

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The Low Moor Iron Co. is operating one furnace at Low Moor and the Covington furnace. Additional stoves are being built at Low Moor to make it possible to operate together both stacks there. The furnace already is equipped with sufficient blowing power for two stacks and the necessary mains and connections are in place. The A stack, which was operated in 1915 and 1916 and blown out when the B stack was lighted in June, 1916, has been relined and put in shape for early operation. It is hoped by the company that both stacks can be operated together in the near future, although it is understood that there is some question as to the present boiler capacity. The Low Moor company has been building a Dwight & Lloyd sintering plant to sinter a large tonnage of pyrites bought by it in South Carolina. Work has been at a standstill on this plant for some time. It is expected to be completed and in operation by summer.

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Control of the Lynchburg furnace of the Oriskany Ore & Iron Corp., built about 1908 by W. W. Taylor and Robert A. Parrish, of Covington, Va., from the proceeds of their profitable operation under lease of the two Allegheny furnaces, which was bought last August by Crocker Bros., of New York, recently has been purchased by the Lavino interests of Philadelphia. It is said that the Lavino interests have purchased the entire outstanding preferred and common stock and will terminate the Oriskany company as an independent organization. The furnace now is known as the Oriskany furnace of Lavino & Co., and is operating on ferromanganese. It is understood that considerably over par was paid for the preferred stock and not much less than $50 per share for the common which is a striking indication of the value of Virginia furnaces as producers of ferromanganese

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The Pulaski Iron Co., under the direction of Gen. Haldeman, of Philadelphia, is moving along smoothly with a new and larger furnace. During the winter of 1916-1917, the Pulaski company dismantled its old furnace and built in its place a 250-ton stack of modern construction which has been operating since early in 1917. The plant is equipped with one Ingersoll-Rand and one General Electric turbine blower, concrete bins and steel trestles. It is the largest single stack in the state. This company is one of the old standbys in the Virginia field and has operated year in and year out with low costs and satisfactory profits. Much of its success is due to its joint ownership with the General Chemical Co. of a sulphuric acid and a sinter recovery plant located at its furnace from which it derives one-half of its ore supply. It also owns its own beehive coke ovens in West Virginia. At the present time the Pulaski company has the largest stock of iron of any furnace in the state, being about 8000 tons.

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The Virginia Iron, Coal & Coke Co. is operating five of its seven furnaces, including one of the two stacks at Middlesboro, Ky. The second stack at Middlesboro is being prepared for blast. All of its furnaces, being located on the Norfolk & Western and the Louisville & Nashville are shipping freely. The company has less than 2000 tons of iron on its yards although it has on its books orders for 175,000 tons for first half and early delivery. One of its furnaces has been running on a bad lining for several months and may have to be blown out any day for repairs. This company, in addition to producing its own coke at the Tom Creek ovens, is a larger shipper of coal for tidewater and domestic consumption.

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John B. Guernsey and Co., of Roanoke, are operating the Old Dominion furnace at Roanoke and the Pocahontas furnace at Graham, Va. Both furnaces are producing foundry iron, although the Graham plant produced spiegel in December and will blow in on ferromanganese during the current month. This company is now the second largest producer in the state and has made remarkable progress in the last year. At the Roanoke furnace it is producing a special grade of high-manganese foundry iron for which it finds a ready sale in the middle west and with car-wheel manufacturers. Several orders for this iron have been placed by the American and Italian governments. The manganese in this special iron is supplied by a manganiferous ore produced at the company's mine nearby. The Guernsey company also operates its own coal mines and quarry. It reports no difficulty with shipments and has less than three days' make of iron in stock. This is one of the few companies in the south maintaining its own traffic department. All of its operations except one mine are located on the Norfolk & Western railway and the Roanoke furnace is also on the Virginian railroad.

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The latest comer in the Virginia field is the Intermont Iron & Coal Corp., operating the Big Stone Gap furnace in the extreme southwestern point of the state. This stack has been operating since the summer of 1917 on foundry iron, most of which moves south and into the middle west. The company is controlled by Tate Irvine and Dr. J. Kelly, of Big Stone Gap, produces most of its coke. It owns mines from which about half of its ore supply is derived. Its plant is equipped with twin stacks, only one of which has been put in condition to operate. Its productive capacity, however, is confined to that of one stack by reason of its limited complement of engines and boilers and stoves.

Rapid Work

Done in Building of Federal Shipyard —Will Launch Soon

Among the feats of rapid construction characterizing the execution of the government shipbuilding program in the east, is the practical completion of the yard of the Federal Shipbuilding Corp., at Kearny, N. J. The company, which is a subsidiary of the United States Steel Corp., already has completed six shipways and the remaining four are 80 per cent done. Vessel construction has been so far advanced that the first boat is expected to be launched by the latter part of April or the first of May. After that, one boat is expected to be launched every two or three weeks and 10 vessels are to be completed by the end of this year. By 1919, it is expected, vessels will be launched at the rate of 20 per year.

The buildings which already have been completed include a 200 x 1000-foot plate shop which is also to house the mold loft; a boat shop 550 feet long, a powerhouse, furnace, joiner, paint and sheet metal shops, a temporary mold loft and a main stores building and two branch stores. The building now being used temporarily as a mold loft, later will be employed as an office. In addition, five auxiliary buildings have been completed. They include an employment office, a temporary hospital and military barracks. Among the unfinished buildings are a forge shop, a permanent machine shop and an office building.

For the completion of the 10 vessels to be launched this year 26,000 tons of plates will be required. Of these, 17,000 tons of hull plates already are on the ground or are in transit.

Parcel Out British Iron

Virtually Rationing Resorted To—Forbid Pipe Making for Stock—Higher Mill Wages Cause Price Inequalities and Irregularity

Bureau of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Feb. 21, 1918.

PRESSURE for pig iron continues very keen, and the iron situation increasingly resembles that of food in the fact that a certain amount of "rationing" has become necessary. No customer is getting all the iron he orders, but the dealer and manufacturer send out supplies as far as they can, in the order of national importance, and with the fullest possible regard to the relation of the customer to the war. Acceptances of new orders are becoming rather rare, and, in all cases, the tonnage booked is materially cut down. We are still a good deal disturbed by labor troubles, and on Saturday last the workers at a number of blast furnaces, on the ground of certain alleged grievances, handed in their notices. There was much discussion and negotiation during the week end, the general result of which was that by Monday the last of the notices had been withdrawn. In order to relieve the shortage of foundry iron, pipe makers have been forbidden to manufacture pipe for stock, orders accordingly being restricted solely to those contracts able to secure the necessary priority certificate.

Buying by the Month

In the north of England buying is now on the monthly system, and most allotments have been made for the month of February. The market manifests a strong tone, with a full maintenance of maximum prices. A considerable amount of buying of foundry and forge iron is being carried through, on behalf of midland and Scottish consumers. Still more could be done if makers could guarantee deliveries; but in this matter the position is improving somewhat as the open weather which has prevailed since the beginning of the year has greatly assisted railway transit. With a little more tonnage available, shipments to allies show some little increase. The warrant stock is substantially unchanged at 442 tons. The make has been reduced a little by the blowing out of a furnace urgently in need of repairs. Hematite continues very much in demand, with supplies continually below requirements. One of the inevitable results of the constant extensions to steelmaking plants has been a great increase in the consumption of ganister, silica brick and other refractory materials. Important extensions have been made in connection with all the known sources of supply. In Derbyshire large quantities have recently been obtained from Dore and Totley, while new operations have been started in Millhouses Woods, in the Sheffield area.

Workmen Are Well Treated

Now that wages have been substantially advanced the question of prices has become urgent. As announced a week ago, puddlers' wages have become 19s 6d $(4.68) per ton, an unprecedented rate of pay in this country. The latest report of the wages board for the two months ended November and December sets out the wages arrangements in detail. The sliding scale adjustment has been effected by the addition of £1 5s ($6) per ton to the ascertainment under the sliding scale. The raising of the selling price by this amount will give the men 12½ per cent advance. One difficult problem was to secure the proper payment of the "underhand puddler", or the puddler's assistant. It is provided that the underhand must be paid, by the forehand, one-third of the amount resulting from the 12½ per cent, and the 2½ per cent accruing under the sliding scale ascertainment—that is of the total of 15 per cent; the puddler receiving 1s 6d (36 cents) per ton advance will pay his assistant 6d (12 cents) as his share of the rise. No serious difficulty has arisen, the men being fairly content with the settlement. There are, however, some troubles still to be dealt with, at foundries and other works not governed by the wages board, where it has not always been easy to apportion the payments, and at the same time carry out the employer's wish to enable the lowest paid workmen to obtain the larger benefit from the advance authorized by the ministry of munitions.

The remaining problem is that of prices. The workmen have been fairly satisfied, but this has been at the expense of the manufacturer. The ministry of munitions very readily gave the men the 12½ per cent. But a rather different spirit is shown when the manufacturer asks that he shall be adequately recouped for this expenditure. The position of the maker of common iron is a very difficult one. This iron now has a maximum of £13 15s ($66) and did not share in the 10s ($2.40) advance made upon marked bars recently. It will be observed that the midland wages board report of selling prices in November and December shows an average selling price of £15 10s ($74.40) as the basis for the payment of wages. The maker of unmarked iron accordingly is paying on the basis of £15 10s ($74.40) for the manufacture of iron which he is not permitted to sell at more than £13 15s ($66). A short time ago when the ministry of munitions was interviewed, details of costs were submitted and it was shown that ordinary iron costs £14 8s ($69.12) to produce, or 13s ($3.12) above the maximum price permitted by the ministry of munitions. The only response yet obtained to an appeal for a better price is a promise of a subsidy of 5s ($1.20) per ton, which the makers point out is not enough to repay them their actual losses.

Price Stability is Upset

The position has become somewhat chaotic. It is a kind of open secret that a great deal of iron is being paid for at prices over the £13 15s ($66). Indeed the stories in circulation show a remarkable gamut of rates running up far beyond any such figure. It is admitted this is an unhealthy state of affairs particularly as some works still are conscientiously adhering to the nominal maximum.

The demand for puddled iron is continually increasing and prices have enhanced. Latterly it has been possible to buy at £12 10s ($60) to £12 15s ($61.20) but makers now easily realize £13 ($62.40). All the mills have a heavy accumulation of work on hand in all departments. The output of the district has been remarkably steady, the 17 selected firms whose sales form the basis of the wages board report producing in November and December 31,034 tons, as compared with 31,504 tons for the previous two months. All works devoted to cable iron have a constant demand, some mills rolling continuously this class of material.

Steel continues very much in demand, with a great call for scrap, much more in fact than can be furnished. Light sheets and plates for aeroplane construction are being much called for.

In the Glasgow district the steel mills are constantly in arrears owing to the steady stream of fresh orders. Nearly all the output of steel is absorbed by the home market, only the most urgent orders from allies receiving consideration.

January Imports Lowest

Tonnage of Iron and Steel Received Only 12,875 Tons, Smallest During War—Pig Iron and Scrap Slump

THE tonnage of imports of iron and steel products in January was at the lowest rate recorded since the beginning of the war. The advance report of the bureau of foreign and domestic commerce shows that only 12,875 tons of these products were shipped into the United States during the first month, compared with 40,910 tons in January, 1917, and 13,769 tons in December, 1917.

The steady decline in imports during the past nine months has been due almost entirely to the falling off in receipts of pig iron and scrap. Only 4226 tons of scrap were shipped into this country in January, 1918. While this tonnage exceeded the December, 1917, figure of 3428 tons, it fell far below the January, 1917, total of 28,066 tons. In pig iron, the imports were only 1492 tons, or about one-third of the December, 1917, total of 5143 tons. January, 1917, pig iron imports amounted to 9428 tons.

Some of the semifinished and finished products show a considerable increase compared with the January, 1917, report. This is especially true of ingots, billets and blooms, structural shapes and rails.

Iron ore imports into the United States were extremely light in January. The total tonnage for that month was 38,081. In the first month of 1917, 97,440 tons of iron ore were received in this country, and in December, 1917, the tonnage was 58,163. For the seven-month period ending with January, the 1918 figure was 549,515 tons, and for 1917, 788,297 tons.

IRON ORE IMPORTS, GROSS TONS

	January,		Seven months ending January,	
	1918	1917	1918	1917
Spain	1,989	34,976	20,796	117,116
Sweden	.....	6,324	17,718	107,937
Canada	491	2,807	141,607	78,265
Cuba	35,601	50,250	350,957	432,845
Oth. countries	.....	3,083	18,437	52,134
Total	38,081	97,440	549,515	788,297

A study of pig iron exports for the past seven months of the fiscal year shows sharp declines to all countries except England, Canada and Cuba as compared with a similar period a year ago. In the seven months pig iron shipments to France totaled only 3256 tons, a loss of 84,387 tons from January, 1917. There were no shipments at all during January, November or October and in December the total was only 105 tons, in August 400 and in September 729. July's shipments of pig iron to France had the largest monthly total, 2022. That month showed a loss of only three tons from July, 1916. Despite a drop of 110,358 tons from the total of 195,979, Italy's consignment of pig iron in January was the second highest of all countries, being 2620 tons less than England's. Italy's seven months' total in 1917 was the highest of all with France's 87,643 tons being second. There were only 961 tons consigned to Italy in January as against 13,091 tons a year ago.

IRON AND STEEL IMPORTS, GROSS TONS

	January,		Seven mths. end'g January,	
	1918	1917	1918	1917
Pig iron	1,492	9,428	34,631	84,032
Scrap	4,226	28,066	46,791	114,431
Bar iron	5	47	1,710	3,895
Ingots, billets & blooms	4,847	1,884	31,482	12,335
Struc. shapes	880	197	6,542	664
Rails	822	271	6,343	10,596
Sheets & plates	107	265	1,018	1,093
Tin & terne pl'te	.....	31	.....	518
Tin scrap	367	718	5,206	4,754
Wire rods	129	3	1,164	2,063
Total	12,875	40,910	134,887	234,381

A decline of 3040 tons in shipments to England in January, compared with a year ago, did not interfere with an increase of 10,338 from the seven months' total of 78,003 of 1917. Gain in Canada's receipts was greater, however, an increase of less than 500 tons in January swelling the seven months' total to 76,848 as compared with 60,620 last year. Cuba's consignment in January was 105 tons, as compared with January, 1917, and in the seven months it received 4060 tons. A year ago the total was 637 tons. The effect of the embargo on neutrals may be seen in the shipments classified for "other countries". Here January's total was only 1351 tons compared with 11,089 tons last year while the seven months' shipments aggregated only 40,726 tons, little more than 63,000 tons less than in the compared period.

Speed Destroyer Work

Plans are ready for the laying of five destroyer keels simultaneously at the new Victory plant of the Bethlehem Shipbuilding Corp., Ltd., Squantum, Mass. Destroyer construction is to be standardized at the plant. Before the war the normal time for the construction of a destroyer was approximately two years. Now bigger and faster boats are to be launched in three months from the laying of the keel and within two months more should be in commission.

Steel Corporation Booked Tonnage Declines

Unfilled orders of the United States Steel Corp., as of Feb. 28, 1918, totaled 9,288,453, while on Jan. 31, they stood at 9,477,853 tons. This represents a decline of 189,400 tons or 1.99 per cent. Improved shipping conditions especially the latter part of the month figured in this loss. On Feb. 28, 1917, the unfilled tonnage figure was 11,576,697, while on Feb. 29, 1916, it stood at 8,568,966. A comparative table follows:

Date.	Total.	Change, tonnage.	Change, per cent.
Feb. 28, 1918..	9,288,453	189,400—	1.99—
Jan. 31, 1918..	9,477,853	96,135+	1.02+
Dec. 31, 1917..	9,381,718	484,612+	5.44+
Nov. 30, 1917..	8,897,106	112,569—	1.24—
Oct. 31, 1917..	9,009,675	823,802—	8.37—
Sep. 30, 1917..	9,833,477	573,572—	5.51—
Aug. 31, 1917..	10,407,049	433,115—	4.16—
July 31, 1917..	10,844,164	539,123—	4.74—
June 30, 1917..	11,383,287	503,304—	4.24—
May 31, 1917..	11,886,591	296,492—	2.43—
Apr. 30, 1917..	12,183,083	471,439+	4.02+
Mar. 31, 1917..	11,711,644	134,947+	1.16+
Feb. 28, 1917..	11,576,697	102,643+	0.90+
Jan. 31, 1917..	11,474,054	73,232—	0.64—
Dec. 31, 1916..	11,547,286	488,744+	4.43+
Nov. 30, 1916..	11,058,542	1,043,282+	10.41+
Oct. 31, 1916..	10,015,260	492,676+	5.18+
Sep. 30, 1916..	9,522,584	137,133—	1.42—
Aug. 31, 1916..	9,660,357	66,765+	.69+
July 31, 1916..	9,593,592	46,866—	0.48—
June 30, 1916..	9,640,458	297,340—	3.09—
May 31, 1916..	9,937,798	108,247+	1.11+
Apr. 30, 1916..	9,829,551	498,550+	5.34+

Protest Car Charge

Vigorous protests are being filed by Illinois manufacturers with the war industries board against a proposed charge for placing cars on sidings. The board has announced that $2 will be charged for each car placed on an industrial siding and $1 additional if the car is spotted at any special point. John M. Glenn, secretary of the manufacturers' association, states that these charges would fall on those who have saved the railroads trouble and expense by providing their own sidings.

Plan Army Warehouses

The United States government has bought 300,000 square feet in the central manufacturing district in Chicago for $375,000 and will proceed at once with the construction of several 6-story warehouses estimated to cost $2,800,000. They will be occupied by the quartermaster's and the ordnance stores of the army and are to be completed within six months.

Centralize Authority in War Board

Chairman Baruch Made Individually Responsible for Results Instead of Old Regime of Joint Control—Price Fixing Given Into Hands of Separate Board of Various Government Representatives

WASHINGTON, March 12.—Final authority over practically every side of the war management of industry except that of pricemaking now has been given into the hands of Bernard M. Baruch, the new chairman of the war industries board. This is the way the situation now sizes up after an opportunity has been given to weigh the significance of the President's recent announcement. While Mr. Baruch's appointment does not mean that the war industries board will exercise greater authority, it does concentrate the responsibility. Whereas previously all members of the board jointly were chargeable with the administration of its functions, these duties now primarily rest upon the chairman. The result of this greater centralization of authority is expected to be found in increased efficiency.

President Wilson clearly indicated the new line-up of the board in his letter to Mr. Baruch tendering the appointment to him. He said "the board should be constituted as at present and should retain as far as necessary and so far as consistent with the character and purposes of the organization, its present advisory agencies; but the ultimate decisions of all questions, except the determination of prices, should always rest with the chairman, the other members acting in a co-operative and advisory capacity".

In the same connection President Wilson summarized the duties of the chairman acting as "the general eye of all supply departments in the field of industry". He should (1) act for the joint and several benefit of the supply departments of the government; (2) let alone what is being successfully done and interfere as little as possible with the present normal progresses of purchase and delivery in the several departments; (3) guide and assist wherever necessary as in the allocation of contracts, in obtaining access to materials in any way pre-empted or in the disclosure of sources of supply; (4) determine what is to be done when there is any competitive or conflicting interest between departments in the matter of supplies, as where there is not a sufficient immediate supply for all or where there is competition for the same source of manufacture or supply, or where contracts have not been placed so as to get advantage of the full productive capacity; (5) see that contracts and deliveries are followed up where such assistance is necessary; (6) anticipate the prospective needs of the several supply departments of the government and their feasible adjustment to general industry as far in advance as possible in order that the business men of the country may be given as definite an outlook and opportunity for planning as possible.

A New Price Board Provided

New machinery for the creation of prices is brought about by Mr. Baruch's appointment. This will be made up of a committee consisting of the chairman, members of the board immediately charged with the study of raw materials and of manufactured products, the labor member of the board, the chairmen of the federal trade and tariff commissions and the fuel administrator. With the exception of the raw materials member of the board, yet to be appointed, and the representative of the fuel administration, the make-up of the new price board is known. It is as follows:

Mr. Baruch, chairman and the chairman of the war industries board.

R. S. Brookings, member war industries board representing manufactured products.

Hugh Frayne, member war industries board, representing labor.

W. J. Harris, chairman federal trade commission.

P. W. Taussig, chairman tariff commission.

Member war industries board, representing raw materials, not yet named.

Representative of fuel administration, not yet named.

The new board will have its first broad opportunity to function when the conference is held within the next two weeks with the manufacturers to consider the prices to be fixed on steel materials dating from April 1. It is thought that W. S. Blauvelt, coke director of the fuel administration, will be present at the steel conference, representing that branch of the war management.

The chairman of the war industries board, according to the President's outline, "should be constantly and systematically informed of all contracts, purchases and deliveries, in order that he may have always before him a schematized analysis of the progress of business in the several supply divisions of the government in all departments".

Transportation questions are expected to be taken care of by the "priorities of delivery" section established by the President when he advised that a committee consisting of Mr. Baruch and official representatives of the food, fuel, railroad administrations, the shipping board, and the war trade board be named. Through this committee it is hoped to obtain "common, consistent and concerted action". In priorities of production the chairman is to be assisted and as far as practicable, to be guided by the present priorities organization "or its equivalent". In the function ascribed to the war industries board by the President is included the making of purchases for the allies. Mr. Baruch consequently will become the chief figure in this buying to the extent that the commissions of the allies have allowed the United States to supervise their purchases. Neither Mr. Baruch nor the board actually has the power to make purchases for the departments of the American government.

Still Further Power is Possible

Mr. Baruch's elevation to the chairmanship of the war industries board is interpreted to mean that the way is being prepared for further delegation of power to him by the President if the latter so wills when the Overman bill becomes a law. The indications are that the latter event will take place shortly.

Two vacancies on the war industries board now are up for appointment. One is the chairmanship of the raw materials division vacated by Mr. Baruch. The other the chairmanship of the allied purchasing commission and the vice chairmanship of the war industries board formerly filled by Judge Robert S. Lovett, who has become construction manager of the railroad administration.

Daniel Willard, formerly chairman

of the war industries board, has been re-elected chairman of the advisory committee of the council of national defense. At the same time, Grosvenor Clarke and Walter S. Gifford have been named secretary and director, respectively. This tends to clarify the situation inasmuch as it had been thought when Mr. Willard resigned as chairman of the war industries board he also stepped down from the advisory committee.

Shipbuilding Record is Above Estimates

WASHINGTON, March 12.—Definite figures showing America's progress in building steel ships have just been given out by the shipping board. Up to March 1, the board records the delivery of 26 ships of 200,241 tons. The March record is expected to add approximately as large a tonnage, bringing the total for the first quarter of 1918 close to 400,000 tons.

The detailed figures show that in January, 9 ships of 79,541 tons were delivered. In February, 17 ships of 120,700 tons were delivered. The March record is expected to show the delivery of 23 ships of 188,275 tons. The launchings during the same months also have been disclosed. January shows 16 ships of 112,500 tons launched; February 15 ships of 77,900 tons, while in March 35 ships of 220,591 tons are scheduled for sliding down the ways.

These records indicate that the total tonnage of steel ships produced in the United States in 1918 will surpass the lowest official estimates and may approximate closely the highest mark which the board had set last summer. Last year when the shipping board embarked on its gigantic shipbuilding venture, the avowed goal was 6,000,000 tons in 1918. Hampered by the fact that most of the leading yards of the country were already filled on naval work, the board in the face of its own delays in organizing has lately lowered that estimate. Various officials in public and private, have indicated their belief that a production of from 3,000,000 to 4,500,000 tons in 1918 would be the maximum.

Private estimates have ranged from 2,500,000 tons to 4,000,000 tons. The lowest figure failed to take into account the law of increasing returns and it is this law which the first quarter figures reveal is operating to boost the actual monthly totals of ships delivered.

February's total shows an increase of 40,000 tons or 50 per cent over January. March figures indicate a further gain of 68,000 tons or 57 per cent over February. If each succeeding month this year reveals only a 70,000-ton increase over the preceding month, the year's output will be well over 5,000,000 tons.

In view of delays resulting from labor shortage, irregular operations, and transportation difficulties which have held up materials, this figure may prove to be well above the actual record for the year. But the biggest yards which are being built to fabricate ships have not yet begun to produce. Publicity given during the past few days indicates that splendid progress is being made in completing these yards. Keels are being laid at Hog Island, Pa., ships are assuming shape at Bristol, Pa., while the new yard of the United States Steel Corp. at Kearny, N. J., is practically completed and will record its first launching probably late in April. When the big, new fabricating yards begin later in the year to turn out ships, the estimated monthly increase of 70,000 tons may not prove excessive.

Chairman Hurley of the shipping board in an address a few days ago stated that "we have today 130 yards, 700 ways and 500,000 men. With these we can turn out 1600 ships this year."

Further Regulate Exports of Tin and Terne Plate

Washington, March 12.—To conserve tin and terne plate for essential uses of the United States and the allies and in harmony with the general plan to keep such material from Germany, her allies and countries likely to aid them, complete supplemental regulations restricting its exportation, have been announced by the war trade board. Export licenses will only be granted on shipments to Canada, Japan, China and South and Central American countries, including Mexico and the West Indies, when containers for food for Germany's enemies are to be made; when oil cans are to be made, provided the plate was ordered prior to Aug. 28, 1917; when used for purposes contributory to the war in all licensed countries except Canada, and when destined for Canada to be used for purposes now permitted in the United States.

Applications must be accompanied by affidavits and guarantees since every precaution will be taken that tin exports will be used only for their sworn purpose. Violations are punishable under the espoinage and trading-with-the-enemy acts. No extensions or renewals for licenses issued prior to Feb. 16 for such exports will be made. When a shipment cannot be made during the life of a license, new applications must be filed.

When the board believes that such tin articles as tinned rivets, lanterns, lamp founts, wire, kitchen utensils, tableware, toys, etc., will contribute to America's war cause, licenses may be issued, except to European and African countries. License may also be granted for phosphorized tin, white metal, other tin alloys and empty tin containers if they will assist in the war. No license is required for export of filled tin or lined with tin containers or tin foil used as a wrapper or container of licensed goods.

Propose Higher Rate for Plant Car Service

Washington, March 12.—While railroad administration officials refuse to admit it, it is said authoritatively that the establishment of a charge of $2 a car for placing it on an industrial plant siding and of $1 additional for spotting it within the plant yard has been duly considered. It is stated that the ruling has been drawn up and is ready for promulgation by Director General McAdoo. It is estimated that such charges would net the railroads many millions annually. Complaints from shippers, who charge that railroad representatives making up Director McAdoo's staff have taken advantage of the opportunity, have been filed and members of congress have been enlisted in the fight. Manufacturers claim that permission to make such charges would be highly discriminatory, under present conditions with other costs mounting steadily.

Draft Won't Cripple

That the next draft, which will call approximately 800,000 men to the colors, shall not cripple industry, is the intention of the war department. Secretary of War Baker has arranged that they shall be called gradually as requirements dictate to fill up divisions. Disorganization of industrial and agricultural affairs of the country will thus be reduced to a minimum, and farmers particularly will be benefited. Since revised rules for the instruction of medical advisory boards are being sent out by Provost Marshal General Crow-

der to local boards throughout the country, it is expected that the date of the next draft will shortly be announced. These new regulations required that each man summoned shall be placed in one of four classes: (1)—Acceptable for general military service; (2)—acceptable for general military service after being cured of remedial defect; (3)—acceptable for special or limited military service in a specified capacity or occupation and (4)—rejected and exempted from any military service. Another 75,000 of the old draft still remain to be called before the first quota of 687,000 is completed. These men will be summoned in April. A date for the nert draft will then be announced.

Capital Odds and Ends

WASHINGTON, March 12.—Increases in carload rates per net or gross ton on pig iron by way of carriers in western trunk line territory have been asked by the railroads as follows: Twenty-five cents, northbound, and 75 cents, southbound between Duluth, Ashland, Wis., Gladstone, Mich., Sault Ste. Marie and Chicago; 50 cents, northbound and 25 cents southbound, between St. Paul and Chicago; 50 cents, northbound and 30 cents, southbound between St. Paul and St. Louis; 5 cents northbound, and 50 cents southbound between St. Louis and Duluth; 25 cents from St. Louis and Milwaukee, to points on the east and west banks of the Mississippi river. The carriers also ask an increase of 50 cents in pig iron rates from all points of origin to all points of destination as listed in their various tariffs, except as specified. Where current rates are not over 50 cents the proposed increase is 10 cents, and where current rates exceed 50 cents and not over $1.25 the increase proposed is 25 cents.

Cancellation of commodity carload rates on iron ore from Ishpeming and Negaunee, Mich., to Newberry, Dollar Bay, and Houghton, Mich., and of the interstate carload commodity rate of 95 cents per gross ton on iron ore from Newberry to Boyne City is sought by the Duluth, South Shore & Atlantic railroad.

The Central railroad of New Jersey seeks establishment of rates on copper, copper articles, lead and silver ore, sulphate of nickel, brass ingots and scrap brass based on valuation not in excess of 5 cents per pound or release to 5 cents per pound in case of loss or damage.

Salaries paid by manufacturers, firms or individuals to employes in the war service of the United States may be deducted as necessary expenses in computing net income for income, war income, and excess profits tax.

The federal trade commission has complained against the American Agricultural Chemical Co. of Connecticut and the Brown Co. of New Jersey, charging attempts to suppress competition in the fertilizer manufacturing industry. Hearing will be held April 10.

D. M. Folsom, formerly connected with Leland Stanford University, has been appointed federal oil director for the Pacific coast.

Horseshoe makers will be interested in the fact that despite the demand for war horses and mules, American farmers have employed steadily increasing numbers on their farms. The department of agriculture estimates that there were approximately 353,000 more horses and 100,000 more mules on farms Jan. 1, 1918, as compared with a year ago.

Carriers have asked for cancellation of the basis of rates on iron or steel car stoppers from Columbus, Miss.

The Alabama Great Southern railroad has asked for cancellation of the carload commodity rate of 26½ cents per 100 pounds on cable reels, K. D., and cable-reel material, wooden, straight or mixed carloads, minimum weight 30,000 pounds from Moundsville and Soibert, Ala., to Muncie, Ind.

The Pennsylvania railroad wants an increase from $2.50 to $2.70 per ton in the rate on scrap iron and steel from Lancaster, Pa., to Earlston, Scotia, Vail and Per Se, Pa.

The Southern railroad desires an increase to 8 cents per 100 pounds on machinery or other bulky articles in the transfer charges at Norfolk and Piners Point, Va.

The Baltimore & Ohio railroad lines west has applied for cancellation of the rules governing the stopping in transit of structural iron and steel in carload lots for fabrication at Wilmington, Ohio.

Cancellation of carload commodity rate of $2.84 per gross ton on iron and steel rails and $3.43 per net ton on iron and steel track fastenings from Terre Haute, Ind., to Blair, Wis., has been asked by the Chicago & Eastern Illinois railroad.

The Charleston & Western Carolina railroad wants an increase from $2 to $2.24 per net ton in carload commodity rate on manganese from McCormick, S. C., to Birmingham, Ala., and related points.

Increase of five cents per gross ton in the car load rate on pig iron has been asked by the Chesapeake & Ohio railroad from Beuna Vista, Covington, Glen Wilton, Groshen, Iron Gate, Longdale, Low Moor and Reusens, Va., to Stroudsburg, Pa.

Carriers have applied for cancellation of carload commodity rates on iron ore from St. Louis and points on the Ohio river to Chattanooga, Tenn., Roseville, Ga., and other destinations in this district.

The Lehigh Valley railroad has asked for restriction of the rates on copper ore, bullion, bars, cakes, ingots, matte, pigs, scale, slabs, sulphates and lead and silver ores from and to points named in several of its tariffs to provide that rates apply only when actual value of shipments does not exceed five cents per pound.

The New York Central railroad has asked an increase from $1.48 to $1.80 per net ton on mine rails and ties from Burnside, Cherry Tree, Five Points, Patchen, St. Lu and Westover, Pa., and an increase from $1.84 to $1.90 per net ton from intervening stations, Hawk Run to Johnsonburgh, and Sykes, Pa.

All chemical industries except those specifically exempted by the food control act, manufacturing, storing or distributing fertilizers or ingredients must secure licenses on or before March 20, 1918. Exception is also made so far as licenses have been issued under the proclamation of Jan. 3 relating to ammonia, ammoniacal liquors and ammonium sulphate.

The fuel administration interprets "coal for foreign purposes" to mean coal put in bunkers in any ship bound for a foreign port. This amendment to the order issued Dec. 13, provides that no fuel will be billed at the special bunker price, which allows an additional $1.35 per net ton, until the coal has actually been bunkered. Any coal for government ships or shipped to any governmental possession or dependency does not take a special bunker price.

The Marting Iron & Steel Co.'s reuest that railroads serving its plant at Ironton, O., be ordered to re-establish an allowance per car moved within the plant enclosure has been denied. The decision is in the "second industrial railways case" and defines the steel company's use of its two locomotives as "plant facility and not as a common carrier." Carriers may not make allowance for switching charges between points of interchange and points of final placement.

Fixed Prices

On Refractories Reported Agitated by Some Buyers—Output Restricted

Refractories interests in the Pittsburgh district are interested in reports that some consumers are attempting to have congress enact legislation fixing the prices for their products. It is claimed that this step has been taken by a number of smaller purchasers, but no information is available to give authenticity to the report. Some makers of iron and steel, it has been asserted, contend that inasmuch as the prices of their products are regulated by the government they should be protected against advances in the prices of materials they buy, including refractories, clay, limestone, etc. Consideration is said to have been given to the plan of incorporating these items in the Pomerene bill, which, as now framed, covers only iron and steel products.

It has been pointed out that prices for refractories have remained stationary since the outbreak of war, despite the increasing costs of labor, operations and materials producers have to buy and in face of the heavy demand for their output. This is held to be sufficient reason for not attempting to regulate prices of refractories. Embargoes still make it difficult to obtain coal, limestone and other requirements and have made it necessary to restrict manufacturing operations.

In the Ohio districts, prices form a minor problem, as the delivery conditions remain abnormally acute. Orders are plentiful regardless of price, but the manufacturers able to make deliveries. One operator reported that during the entire month of February only 7 per cent of the cars ordered were obtained from the railroads, and a total of one day's supply of cars was set during the first 10 days of March. Releases, priority orders and the evident urgency of the steelmakers' needs do not enable the maker of refractories to secure cars.

Refractories

(Per 1000 f. o. b. works)

FIRE CLAY BRICK.

(First Quality)

Pennsylvania	$45.00 to 55.00
Missouri-Illinois	55.00 to 65.00
Ohio	45.00 to 50.00
Kentucky	45.00 to 55.00
New England	55.00 to 65.00

FIRE CLAY BRICK

(Second Quality)

Pennsylvania	$40.00 to 50.00
Ohio	35.00
New England	48.00 to 58.00

SILICA BRICK.

Pennsylvania	$50.00 to 60.00
Chicago	55.50 to 65.50
Birmingham	45.00 to 55.00

MAGNESIA BRICK

(Per Net Ton)

9 x 4½ x 2½	$135.00 to 160.00

CHROME BRICK

(Per Net Ton)

9 x 4½ x 2½	$135.00 to 140.00

BAUXITE BRICK

(Per Net Ton)

55 per cent	$40.00 base
76 per cent	100.00 base

Ingot Output

Gains in February But is Below Last Year's Record

Steel ingot production in February increased slightly over the January record. The output of 29 steel companies, which in 1916 made 88.14 per cent of the country's total ingot production, was 2,280,901 gross tons in February against 2,203,845 gross tons in January. These companies make monthly reports to the American Iron and Steel institute.

The steel furnaces are operating, however, well below the rate maintained in the last half of 1917. As shown in the following table, these companies averaged in 1917 a monthly output of about 3,000,000 tons or between 700,000 and 800,000 tons more monthly than has been produced in either of the opening months of this year. These figures follow closely the record of pig iron production during the same period. Blast furnaces which during the last half of 1917 averaged a monthly production of about 3,200,000 tons, averaged during January and February only 2,360,000 tons.

Steel ingot production since June, 1917, follows:

Months	Open-hearth Gross tons	Bessemer Gross tons	All other Gross tons	Total Gross tons
June, '17	2,265,772	809,552	8,605	3,083,929
July	2,152,479	777,171	9,465	2,939,115
August	2,251,013	863,873	8,331	3,123,217
September	2,195,556	770,064	6,639	2,972,259
October	2,475,754	870,494	5,687	3,351,935
November	2,384,218	772,489	9,550	3,166,257
December	2,195,832	524,084	13,806	2,733,722
Jan., 1918	1,763,356	429,588	10,901	2,203,845
February	1,812,393	454,457	14,051	2,280,901

Makes Ship Castings

The Marsh & Allard iron foundry has begun operations at Tacoma, Wash., and is specializing in gray iron ship castings. A building has just been completed. Karl E. Marsh and William H. Allard, recently from the east, are the operators. The company is financed by the Safety Investment Co., of which Allen C. Mason is president.

Toluol Supplies

For General Manufacturing to be Distributed—Uncertainty in Sulphate

New York, March 9.—The most important development in the coal tar products market is the appointment by the war industries board of a committee in charge of C. A. Morehead to pass upon applications for toluol for ordinary commercial uses. The need for toluol has reached a most acute stage and manufacturing dependent upon it as a raw material has been widely affected. It is regarded as likely that after the government matures its plan for practically substituting benzol for toluol as a base for high explosives, the supply of toluol for ordinary commercial uses will be broadened. In the meantime, offerings are confined to small quantities by second sellers, asking prices ranging from $5 to $6 per gallon.

Constantly increasing government requirements of sulphate of ammonia has caused uncertainty as to contracts expiring at the end of April. Some producers believe that instead of renewing contracts, it will be necessary, after government requirements have been met each month, to distribute the remainder on a pro rata basis. The government this week distributed orders for several hundred tons. A few spot carloads went at advanced prices. The spot market stands at $5.35 to $5.40 per 100 pounds.

Sales of benzol were fairly large, but heavy production prevents any shrinkage in stocks. Pure benzol is quoted at from 35 to 40 cents per gallon, but on large quantities this range can be shaded. Solvent naphtha demand has increased materially and stocks still shrink. The market is strong at 18 to 22 cents per gallon.

Coke Oven By-Products

Spot

Per Gallon at Producers Plant

Pure benzol	$0.35 to .40
Toluol	(nominal)
Solvent naphtha	.18 to .22

Per Pound at Producers Plant

Phenol	$0.52 to .55

Per 100 Pounds at Seaboard

Sulhate of ammonia (nominal)	$5.35 to 5.40

Contract

Per Gallon at Producers Plant

Pure benzol	$0.35 to .40
Toluol	nominal
Solvent naphtha	.18 to .22

Per Pound at Producers Plaht

Phenol nominal.

Per 100 Pounds at Seaboard

Sulphate of ammonia.....nominal

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

ROSS H. McMASTER, who has been assistant general manager at Montreal for the Steel Co. of Canada, Ltd., Toronto, has been appointed a member of the Canadian war mission, of which Lloyd Harris, Brantford, Ont., is the head. He soon will be located in Washington and is now awaiting the call to active service. This commission will have charge of Canadian affairs in the United States and Mr. McMaster will be iron and steel purchasing agent for Canada. This is but a further step looking towards a more complete co-operation in war work between the two countries. Mr. McMaster's experience with the Steel Co. of Canada has extended over a period of years.

H. P. Curtiss, 120 Milk street, Boston, has been appointed as representative of the Clarage Fan Co., Kalamazoo, Mich., in New England territory.

H. J. Tierney, with offices at 1742 Railway Exchange building, St. Louis, has been made representative of the Grip Nut Co. He is president of the Tierney Supply & Lumber Co., Chicago.

William B. Nesbitt, New York, was recently elected vice president of the King Motor Car Co., Detroit, to succeed E. A. Barthel, who resigned recently.

Walter D. Munroe, formerly with the city sales force of Joseph T. Ryerson & Son in Chicago, has been made manager of the Pittsburgh branch, succeeding W. A. Miller.

Samuel H. Weilman has been made eastern sales manager of the Detroit Nut Co., Detroit, with headquarters at 256 Broadway. He will cover the territory east of Pittsburgh and Buffalo.

Adam Shepper, Bay City, was elected president of the Michigan Sheet Metal Contractors' association at its annual convention held in Detroit recently. F. E. Ederle, Grand Rapids, was re-elected secretary.

R. S. Cooper was recently elected vice president and general sales manager of the Independent Pneumatic Tool Co., Chicago. Until recently he was that company's New York representative.

Donat E. Gingras has been made foreign sales manager of the Goodell-Pratt Mfg. Co., Greenfield, Mass., drills and hardware specialties. He has been manager of the Greenfield telephone exchange for several years.

Paul T. Irwin has accepted the position of general sales manager of the Lincoln Twist Drill Co., Taunton, Mass., having resigned as sales manager of the gage division of the Greenfield Tap & Die Corp., Greenfield, Mass.

ROSS H. McMASTER

Orello S. Buckner, who has been a chemist for the Norton Co., Worcester, Mass., for some time, will sail from Vancouver, March 14, for Tokio, Japan. He will represent the company there in an investigation looking towards the increase of its business in Japan.

B. F. McCreary, formerly affiliated with the sales force of the Republic Iron & Steel Co., and latterly in charge of sales for the Matlack Coal & Iron Corp., New York, has been added to the sales force of J. K. Larkin & Co., New York, pipe, nuts, bolts, rivets, etc.

G. W. Bichlmeir, formerly connected with the supply departments of the Missouri Pacific and Kansas City Southern railway companies and latterly as secretary-treasurer with the W. L. Sullivan Machinery Co., Chicago, has accepted an important position with the Walter A. Zelnicker Supply Co., St. Louis.

Harry E. Howard, Spencer, Mass., has been appointed special representative in and has left for Tokio, Japan, for the Norton Co., Worcester, Mass., to succeed Stephan J. Anderson, who returned in February to enlist in the United States naval reserve.

Donald Symington, vice president of the T. H. Symington Co., Rochester and New York, malleable iron manufacturers, who is a captain in the ordnance department, will sail shortly for France. His work recently has been inspecting ordnance material for the United States army.

Frank A. Scott, Cleveland, who resigned as chairman of the war industries board because of ill health, has returned from California much improved, although it is understood he will not resume active duty as vice president and treasurer of the Warner & Swasey Co., Cleveland, until May 1.

Lewis M. McCallum, who for many years has been secretary of the Parker Wire Goods Co., Worcester, Mass., resigned recently to accept an important position with M. S. Brooks & Son, Chester, Conn., manufacturers of wire goods. Mr. McCallum is lieutenant-colonel of the 19th regiment Massachusetts state guard.

E. R. Wendemuth, formerly New York representative of the Pacific Hardware & Steel Co., San Francisco, has been placed in charge of the eastern office, 30 Church street, New York, of the Baker, Hamilton & Pacific Co., San Francisco, which is the new name of the consolidated Pacific Hardware & Steel and Baker & Hamilton companies.

A. W. Calloway, president of the Davis Coal & Coke Co., Baltimore, and of the Terminal Railroad & Coal Co., Pittsburgh, has been appointed director of bituminous coal distribution by Fuel Administrator Garfield. In the distribution, Mr. Calloway will have competent coal salesmen and shippers in charge of the various subdivisions of his work.

W. H. Lloyd, president of the Lloyd Metal Co., Houston, Tex., was elected president of the Southwestern Metal Trades Association of Texas and

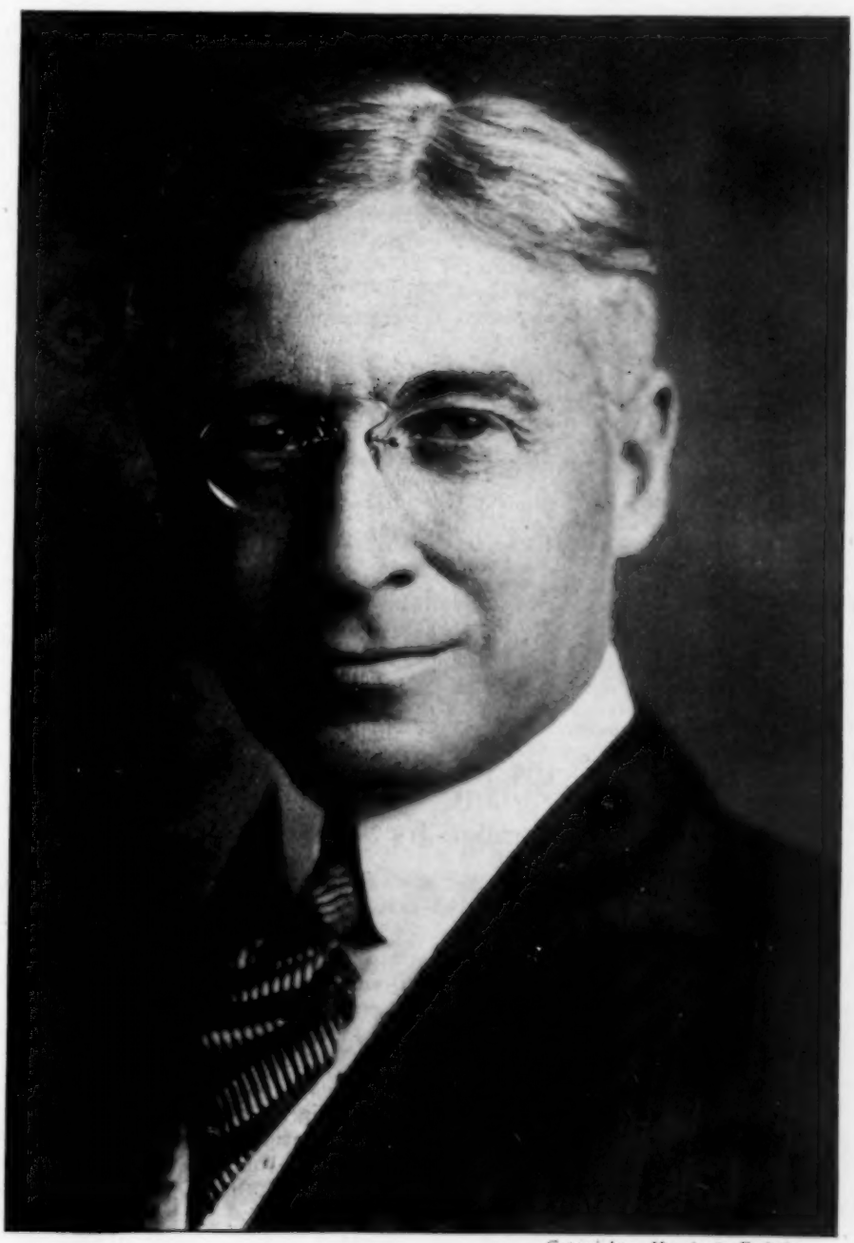
Louisiana for the ensuing year at its annual meeting held in Houston, Feb. 22 and 23, which was an unusually interesting gathering due particularly to discussions pertaining to activity in the shipyards along the gulf coast.

T. McCullum, who has been employed by the Duluth, Missabe & Northern railroad, has been made railway representative in charge of northwestern territory for the Garratt-Callahan Co., with headquarters at Minneapolis, Minn., George Dur. Fairleigh, formerly affiliated with the United States Cast Iron Pipe & Foundry Co., now represents the Garratt-Callahan Co. in the southwest with headquarters at Dallas, Tex., and G. E. Wilson will represent the company on the Pacific coast with headquarters at San Francisco.

Bernard M. Baruch

Who Practically Has Been Made Boss of All Americans Engaged in War Industry

BERNARD M. BARUCH, who last week was appointed chairman of the war industries board by President Wilson, probably has more man-power vested in him than any of the dollar-a-year volunteers in Washington at the present time. He has supervision of all raw and manufacured material needed for the United States' part in the great war. He also purchases all American material for the allies. His name in the past has been a synonym for business efficiency and his appointment makes for greater effectiveness in that important branch of the war machine. Mr. Baruch is not yet 50 years of age and was born in Camden, S. C. After being graduated from the College of the City of New York, he became a broker's clerk and soon mastered the details of the business. He became a broker and the fact that when 32 years old he was a millionaire reflects his buying and selling ability. He was interested in many business ventures, railroads and other utilities, where his inborn business instinct brought uninterrupted success. Mr. Baruch came into national prominence in July, 1915, through his public utterances on national unpreparedness and in September of that year he outlined a plan to mobilize business for the war which he presented to President Wilson and which created a favorable impression. In 1916, he was appointed a member of the council of national defense, as head of the raw materials division of the war industries board under which has come the distribution of iron and steel supplies. It was Mr. Baruch who in March, 1917, was delegated to ask the steel manufacturers to reduce their prices to the government. The steel producers proved their willingness to co-operate fully by making the desired cuts. In August, 1917, he virtually withdrew from private business when he sold his seat on the New York stock exchange, to give his entire attention to his increasing duties and responsibilities at Washington. Mr. Baruch, while characteristically a "silent" man, has often proclaimed himself in favor of greater centralization and already has made great strides along that line in his latest official connection.



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BERNARD M. BARUCH

Iron and Steel Financial News

Up-to-the-Minute Fact and Comment Collected and Sifted For Busy Readers

Profitable Prices Necessary for Output

BITTER attacks on price fixing, made by a group of senators, led by Senator Reed, of Missouri, at Washington, last week reopen the often debated question as to whether price fixing is economically advisable. In the broader sense, many producers of steel, copper and other commodities which have come under the fixed-price plan, are of the opinion that such a policy not only is advisable but essential to the country's economic welfare. They have cooperated with the government to make distribution as successful as possible under the fixed-price plan and have accepted sharp reductions in profits with little complaint. But though they are subordinating their own interests to the government in wartime, they also see peril in fixing prices so low as to curtail production through the inability of the higher cost plants to operate.

Expresses Steel Industry's View

E. A. S. Clarke, president of the Lackawanna Steel Co., in his annual report to stockholders, who has devoted almost his entire attention to working out the government's steel price-fixing policy, in his annual report to stockholders expresses a representative view of the steel industry's attitude toward price fixing. He said in part:

"Consumers of steel throughout the world had for some time realized the probability of such action and the shortage in supply of steel for general consumption which must follow the demands of the United States government for its own requirements, and had, therefore, been in keen competition to supply their own needs. Under the stimulus of this competition prices for all steel products had risen to an abnormally high point, and our government decided that the best interests of the country, looking toward winning the war, called for the fixing of reasonable maximum prices, high enough to stimulate the maximum production, yet such as to prevent undue profits.

"The prices fixed by the government and the committee of the American iron and Steel institute have, with few exceptions, been strictly adhered to, and have resulted in greater stability in the industry. The steel manufacturers, through committees of the American Iron and Steel institute, have also assisted the government in so placing orders for its requirements and those of the allies as to distribute the burden equitably among all the manufacturers of the country."

Urges Maximum Production

But, though the fixing of prices has brought stability to the industry, Mr. Clarke urges that prices be put at a level which will enable the highest cost manufacturers to earn a reasonable profit, as a means of keeping the manufacture of the commodity up to the maximum which is so necessary for America's war making machine.

"A basis of prices that will permit the highest cost manufacturer will secure the maximum production," he said, "which is so essential to the winning of the war and which cannot be had unless prices are such that every manufacturer will have at least a living profit. The final net profits of all will be leveled by the war excess profits tax.

"Costs of production have been increased very greatly, due to higher costs of supplies used and to the increases in wages which have been general throughout the industry, and some adjustment of prices may be necessary in order that manufacturers whose costs are highest may continue to operate without loss."

War Finance Corporation Amended by Senate

Passage of the War Finance Corp. bill by the senate, enabling the government to go ahead with its financial plans, was welcomed in the New York financial district, which believes the bill soon will become a law and will open the way for the next Liberty loan campaign. The new bond issue is to be offered April 6. One material change was made in the measure in the senate. The original bill provided for a capital issues committee of five members, virtually to control all issues of securities of companies having over $100,000 capital. This was to be appointed by the federal reserve board, with the approval of the secretary of treasury and include three of its own members. This committee was to license all issues of securities. The senate, however, hastily changed this provision, to have the President appoint the capital issues committee with confirmation by the senate. In some quarters this amendment was to give the senate control of the selection of men for the committee, with no really sound reason. It was felt that the more the responsibility of such large powers is centralized, the safer the exercise of the law would be, while the danger of politics entering into the program would have been minimized, under the original plan. The house is expected to take action on the measure immediately after it disposes of the legislative appropriations bill. The money market showed a stronger tendency the past week, but Wall street believes as soon as the War Finance Corp. is organized it will exert an indirect but potent influence toward peace in the money market.

Awaits Railroad Buying

President R. P. Lamont, of the American Steel Foundries, in his annual report just issued in pamphlet form, says "the year 1918 starts out boldly" and gave a cheerful forecast of possibilities for the current year. He is quoted as follows:

"We have a large tonnage ahead of the foundries which will keep us busy for six months at least. The miscellaneous business holds up particularly well, and sooner or later the railroads will have to come into the market; a great deal depends upon when they do, but with the large and constantly increasing shortage of equipment it seems certain that as soon as the necessary machinery is provided at Washington the roads must buy large numbers of both cars and locomotives. We have a considerable volume of government work on our books; the margin of profit is small, but it will increase the volume of our business and help carry

overhead. We expect on the whole a satisfactory year."

The company's report shows that it carried $5,531,838 net profits to surplus account, after allowance of $2,287,600 for all taxes. This figures out about $32 a share for the capital stock, as against a little less than $20 in 1916.

Has Fine Initial Year

For the first full year of its operation, ended Dec. 31, 1917, the Transue & Williams Steel Forging Corp.'s gross sales totaled $6,749,771, and after setting aside $360,000 for income and excess profits taxes, the net profit available for dividends was $880,086. While this was equal to $8.80 a share of stock, the corporation paid out dividends amounting to $4.75 a share. The following is the income statement for the year:

For the year ended Dec. 31:	
Gross sales	$6,749,771
Operating profit	1,181,355
Other income	58,731
Total income	1,240,086
Federal taxes	360,000
Net profits for dividends	880,086

Lackawanna Steel Ships High Total in 1917

Production of steel products of the Lackawanna Steel Co. was the heaviest in history, according to President E. A. S. Clarke's message to stockholders which accompanied the financial statement recently published. The company's total shipments decreased 7.35 per cent in 1917 and it is pointed out this is due to the reduced deliveries of pig iron following the sale of the Lebanon properties to the Bethlehem Steel Co. At the average price per gross ton of $64.40, 17,631 tons of pig iron, etc., were sold, an increase of $22.81 over the 1916 average. The balance of 1917 shipments, or 1,184,863 tons of rolled steel products represents an increase of 31,402 tons over 1916. A comparative statement of shipments by product is as follows:

	1917	1916	1915	1914
Stand. rails	310,655	302,149	276,692	176,877
Light rails	7,828	1,748	5,327	6,384
Angle bars, fit'gs, etc.	74,606	89,701	74,165	47,788
Struc. shapes	135,329	142,353	111,613	85,568
Plates	111,370	83,981	44,809	25,941
Merch. steel products	423,046	443,247	229,276	102,259
Sh. bars, slabs, bill., bl'ms.	122,029	90,282	67,487	44,464
Pig iron and misc.	17,631	144,364	94,463	90,461
Total	1,202,494	1,297,825	903,832	579,742

"Your company," Mr. Clarke said, "received during 1917 from mines which it owns, or is interested in, and from other sources 2,105,734 gross tons of iron ore and produced a total of 859,776 gross tons of coke and 975,198 gross tons of pig iron. It also produced 89,592 gross tons of bessemer ingots and 1,492,775 gross tons of open-hearth ingots, a total of 1,582,361 gross tons of steel ingots of all kinds." In speaking of new construction, Mr. Clarke says that while the new 8-inch and 12-inch combination bar mills are not completed, operations had not suffered in any way, since the buildings had been utilized advantageously for other purposes. The new No. 8 blast furnace is about completed. The No. 9 furnace authorized in the year is expected to be completed and in operation about Aug. 1.

War Brings Increase

Because of the entrance of the United States into the war, the past year brought an unexpectedly large increase in the volume of the business of the Worthington Pump & Machinery Corp., according to the annual report, issued recently. To meet the changed conditions, directors have authorized additions and betterments amounting to $3,479,976, of which $2,558,575 was expended during the year. Total bookings last year amounted to $61,130,572, compared with $19,844,452 in 1906. Unfilled orders on hand Dec. 31, 1917, amounted to $41,834,777, an increase of $32,600,056 over Dec. 31, 1916. Sales last year amounted to $28,407,699, compared with $10,655,576 in 1916. The company's manufacturing profits were $6,202,285, which was increased to $6,254,571 through the addition of other income. After allowing total deductions of $1,822,206, including $1,594,857 for federal income and excess profits taxes, there was a surplus for 1917 of $4,432,365, compared with a surplus in 1916 of $1,582,493.

Gains in Last Half

For the six months ended Dec. 31, 1917, the Colorado Fuel & Iron Co., Denver, had gross earnings of $20,739,029 as compared with $17,193,479 in the corresponding period of 1916, a gain of $3,545,550. After all expenses and charges had been met, a balance of $1,647,116 remained, the equivalent of $4.57 a share of common stock, after allowing for preferred stock dividends, the sum of $1,053,678 was carried to surplus.

To Redeem Steel Bonds

The sixth annual drawing of United States Steel sinking fund bonds for the sinking fund was completed by J. P. Morgan & Co., recently. Announcement will shortly be made of numbers representing 1834 $1000 bonds and holders will receive 110 for them, on May 1. A total of $8,662,000 bonds have been taken up by lot since 1913 when the drawings commenced. These have been deposited in the sinking fund. As the interest accumulates, it is added to the money available for drawings. Prior to 1913 bond purchases were made in the open market. Including this last drawing $21,835,000 in bonds have been called in so that the outstaining issue is $178,165,000.

1917 Profits Less

Over a half million dollars less than in 1916 was realized by the Nova Scotia Steel & Coal Co., New Glasgow, N. S., from its operations in 1917. The comparative figures are $1,340,477 for the year ended Dec. 31, 1917, as against $2,104,478 in 1916. Preferred dividends totaled $80,000 while dividends on the common stock were $562,500, leaving a balance of 697,977, which added to the company's previous surplus brought that item up to $4,230,092.

Financial Aid Required

Heavy operating expenses of railroads in the east have caused them to run behind in paying their bills and growing complaints are circulating in iron and steel circles over the delayed payments. This has assumed such a serious aspect that prompt action by the government to finance these purchases is claimed by these producers to be necessary and imperative. The new federal finance corporation when it is in operation is expected to provide relief of such conditions.

Gross Profits Decline

With gross earnings of $8,340,258 for the year ended Dec. 31, 1917, the Semet-Solvay Co., Syracuse, N. Y., earned $2,643,660 less in the year than in the 11 months ended Dec. 31, 1916. The total for the last 11 months of 1916 was $10,983,918. For federal taxes, $3,300,000 was reserved and this with a deduction of $1,178,782 for depreciation, etc., made the balance Dec. 31, 1917, $3,761,302 as against $10,536,612 a year before. Dividends in 1917 totaled $1,599,992 while in 1916 $1,300,000 was paid out, bringing the surplus to $2,161,510 on Jan. 1, 1918. On Jan. 1, 1917, it was $9,236,612.

Gulf States Steel Gains

The Gulf States Steel Corp., Birmingham, in 1917 earned a net income of $5,199,925, against $2,650,006 in 1916, an increase of $1,549,919. After deducting reserves for depreciation and taxes, a balance of $2,882,176 remained.

Many Large Orders Wait on Congress

War Department Projects Extensive Contracts Which Depend on Appropriations Being Made—Extensive Ordnance Construction Will Demand Heavy Machine Tools—Shipyards in Need of Additional Equipment

DELAYED action in congress, it is said, is holding in abeyance a number of important war department contracts which will involve large machine tool purchases. An urgent deficiency bill among other measures is now awaiting congressional action at the request of the war department. This bill provides for an extensive heavy ordnance program. Delay at this time will necessitate speeding up after contracts are awarded. The Browning machine gun has emerged successfully from a series of tests, and important contracts for this arm have been executed or are impending among the large eastern manufacturers of light ordnance. One contract for this gun alone is said to be in excess of $10,000,000. Among the middle western states, heavy ordnance continues to furnish the demand for heavy machine tools. It is understood that the Studebaker Corp., Detroit, has a large contract for 8-inch high explosive shells which will demand the purchase of considerable heavy equipment. In the Cleveland district it is anticipated that contracts will be closed this week involving in excess of $500,000.

The demand for machine tools for shipyard shops continues as the various companies complete their preliminary construction. The American International Shipbuilding Corp. is inquiring for planers and pipe machines for the Hog Island plant where about 25 per cent of the projected shipways are completed. The government is planning the construction of extensions to the Norfolk navy yard. Interest in crane equipment lines is centered on the navy department which will shortly allot a number of cranes, bids for which were received until March 11. Delivery conditions throughout the east are improving slowly, but in the central western states, however, while improvement is noted, machinery deliveries are unstable.

Ordnance Makers Supply Bulk of Inquiries

WHILE a number of miscellaneous orders continually are being placed in the eastern machine tool market, considerable business is being held up as a partial result of slow legislation in Washington. During the past few weeks, the war department has been undergoing reorganization, but progress in this direction has been retarded because of the hesitancy of congress to enact certain legislation now pending. As a result, many contracts scheduled to be placed by the war department by this time are being held in abeyance. However, as these contracts would be for delivery several months in the future, the production of war material has been little affected by this delay. It will necessitate though a speeding up in deliveries when these contracts are placed, and despite certain prevailing conditions it is believed an allotment will be made shortly.

Further Browning Machine Gun Orders Placed

Considerable speculation prevails in the market as to what new demand the manufacture of the Browning machine guns will bring forth. The ordnance department, as a result of the recent successful tests of this gun, has increased orders already on the books of several companies, and has placed a new contract with the New England Westinghouse Co., Springfield, Mass., involving approximately $12,000,000. Other companies known to have contracts for the construction of Browning guns are the Colt's Patent Fire Arms & Mfg. Co., Hartford, Conn.; the Winchester Repeating Arms Co., New Haven, Conn.; the Marlin-Rockwell Corp. and the Remington Arms-Union Metallic Cartridge Co., New York. This latter company recently placed a good-sized order for tools and is still in the market. It is understood that the Savage Arms Co., Utica, N. Y., which has been a large purchaser of tools of late, has now about covered on all of the present requirements of its Utica, N. Y., plant, but is inquiring for several boring and milling machines and other miscellaneous equipment for its plant at Sharon, Pa.

Miscellaneous Tool Demand is of Fair Size

The American International Shipbuilding Corp. is buying a number of pipe machines and other tools for the Hog Island plant. The North American Motors Co., Pottstown, Pa., which is building motor trucks for the government, is inquiring for tools of various types. It is reported that the Submarine Boat Corp., Newark, N. J., which has been inquiring for planers, will extend its list shortly. Among other companies seeking machine tools are the De Laval Steam Turbine Co., Trenton, N. J., the Snead Iron Works, Jersey City, N. J., the American Die & Tool Co., Reading, Pa., and the Baltimore Dry Dock & Shipbuilding Co., Baltimore.

The government has completed plans for additions to the Norfolk navy yard. This expansion calls for the construction of a power house and pattern shop, which will cost in all more than $1,000,000. Kyle & Purdy, builders of yachts, will erect a $150,000 addition to their shipyard at City Island, N. Y. The Continental Shipbuilding Co. has purchased three acres, near Yonkers, N. Y., for the establishment of a yard. The International railroad will build a machine shop at Niagara Falls, N. Y.

Market Interest Centers in Navy Yard Crane List

Much interest in the crane market is centered in the list of cranes for the Washington navy yard. The closing of bids on this machinery has been delayed from time to time, the last date set being March 11. The list includes two 200-ton, one 100-ton, three 25-ton, three 20-ton, nine 15-ton, one 10-ton and two 5-ton electric cranes. It is understood that new bids will be received

AGATHON
Alloy STEELS

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F. Walter Guibert, District Representative.

Cleveland Office—Hickox Bldg.
The Hamill-Hickox Company, District Representatives.

Chicago Office—1370 People's Gas Bldg., 122 So. Michigan Blvd., C. H. Beach, District Sales Manager.

Philadelphia Office—603 Widener Bldg.
Frank Wallace, District Sales Manager.

Syracuse Office—621 University Block.
T. B. Davies, District Sales Manager.

J. E. Dockendorff & Co., 20 Broad St., New York, General Export Agents.

Agathon Nickel Steels
Agathon Chrome Nickel
Agathon Chrome Steels
Agathon Chrome Vanadium
Agathon Vanadium
Agathon High Carbon
Agathon Special Analyses

on another lot to be purchased for the Washington navy yard, and that new specifications will be named. The original specifications called for one 20-ton, one 25-ton and two 10-ton electric cranes. The government is reported to have recently awarded a 30-ton electric crane for use in a storage building at the Philadelphia navy yard to Manning, Maxwell & Moore, Inc., New York. This company also recently received a contract from the Union Drawn Steel Co., Beaver Falls, Pa., for a 10-ton electric crane. The E. I. du Pont de Nemours Powder Co., Wilmington, Del., which recently was inquiring for eight locomotive cranes, has purchased five used locomotive cranes.

Volume of New Business Grows Rapidly

A CONTRACT for 8-inch explosive projectiles, which it is reported has been awarded to the Studebaker Corp., Detroit, may have a considerable effect in stimulating machine tool inquiries in the Cleveland district. The Studebaker Corp. has for some time past been a heavy and consistent buyer in the Cleveland market. Prospects for the week are extremely bright. One dealer expects that the coming week will net him approximately $500,000 worth of orders. Deliveries have not improved perceptibly. Another reports that deliveries on certain types of vertical millers cannot be obtained before March, 1919, and that some types of planers cannot be supplied before December, 1918. Following is a list which has been issued by the Studebaker Corp., Detroit, to supply the tool needs occasioned by its contract for gun carriages for 4.7-inch guns: Four 14-inch lathes; seven 16-inch lathes; three 24-inch lathes; two No. 6 screw machines; seven 24-inch sliding head drills; two 26 or 28-inch sliding head drills; six No. 2 plain milling machines; six No. 3 milling machines; three 20-inch shapers; one No. 3 broaching machine. A supplemental list issued by the Standard Parts Co., Cleveland, embodies the following machine tools: One lathe, 36-inch swing x 10-foot bed; one power hack saw; one wet drill grinder; one surface grinder. R. W. Redd, 850 Book building, Detroit, has inquired in the Cleveland market for prices on five 28-inch lathes. The Columbia Axle Co., Cleveland, requires a horizontal boring mill. Two small planers with 22 to 26-inch x 5 to 8-foot tables are needed by the Thomas Spacing Machine Co., Pittsburgh. Inquiry has been made by the Lake Erie Iron Co., Cleveland, for a used 24-inch heavy-duty shaper. Prices on a used geared-head screw machine are requested by the Falls Rivet Co., Kent, O. The John F. Byers Machine Co., Ravenna, O., has asked for quotations on a punch and shear.

Light Machinery Demand in Chicago

BUYING conditions in the machine tool market in Chicago have changed decidedly from the large inquiry which formerly prevailed. At present, inquiry and buying consists almost entirely of small lots or single tools and for lighter equipment. This business appears to be coming from die and tool makers, gear cutters and machine shops generally. The demand is for small lathes and other light machines, much of which can be filled direct from stock. No inquiry for large equipment is pending now and the feeler recently put out by the Arnold Co., Chicago, for a proposed plant to make 155-millimeter shells has not yet developed to a definite point. Considerable difficulty is met in buying second hand machinery as it is found that practically all equipment for which demand exists is busy in shops and that used machinery where available is held at a high figure. Scarcity exists in radial drills, horizontal boring machines, boring mills and milling machines. The Winther Motor Truck Co. is building a new motor truck plant at Winthrop Harbor, Ill., to handle a government order. The C. Kline Forge Co. will build a forge shop at Detroit. The Hercules Gas Engine Co., Evansville, Ind., will build an addition to its engine shop. The Perryville Stove Co., Perryville, Ind., will build a foundry and machine shop each 50 x 100 feet and a clearing room.

Mixed Conditions Prevail in Pittsburgh Market

INQUIRIES from domestic buyers for machinery and machine tools have fallen off, according to sellers in the Pittsburgh district, although the commercial market has been quiet for a long time. Government inquiries for cranes are numerous. While improvement is being shown in making shipments progress is slower than the trade had hoped it would be.

New Construction and Equipment

Concise and Timely Business Building Opportunities from the Field of Industry

Among New England Factories

AUGUSTA, ME.—The Mining & Development Co. has been incorporated to do a general mining business with $150,000 capital by E. M. Leavitt, Clyde R. Chapman and Ernest L. McLean.

PORTLAND, ME.—The Maine Power Sales Co. has been incorporated to manufacture iron and steel products with $10,000 capital, by Scott Wilson, E. M. Dyer and Eugene L. Bodge.

BOSTON.—The Centrifugal Gun Corp. has been incorporated with a capital of $1,000,000 to manufacture munitions, by Frank L. Jones, Somerville, Mass., Edwin C. Fisher and Earl L. Ovington, Newton, Mass.

BOSTON.—The Merrill Mfg. Co. has been incorporated, to make fuse plugs and all kinds of electrical and mechanical appliances, for $50,000 by William E. Russell, Thomas B. Sweeny and J. C. Rice.

BOSTON. — The New England Industries Export Corp. has been incorporated to do a manufacturing business with $50,000 capital by R. W. Cox, G. M. Stewart and Thomas Raddin, Newton, Mass.

CHARLESTOWN, MASS.—Fire damaged the factory of the Boston Wagon Mfg. Co., 23 Front street, Feb. 26, causing a loss of $25,000.

FITCHBURG, MASS.—The plant of the Fitchburg Foundry Co. was damaged by fire recently with a loss of $5000.

BRIDGEPORT, CONN.—The J. L. Lucas & Son Co., recently incorporated with a capital of $25,000, plans to build a factory for the manufacture of machinery.

BRIDGEPORT, CONN.—William H. Van Tine, architect, Fisher arcade, Detroit, has prepared plans for a 2-story factory 100 x 300 feet, to be built by D. Flint, Providence, R. I., at a cost estimated at $100,000.

EXPANSION with ROLLING MILL JIM

Say fellows—was out to the Hubbard the other day and the boys showed me the plans of the new steel foundry they're putting up. She sure is a humdinger—electric furnaces and all that. The next time I go over I'll rubber around a lot more and tell you all about it.

So long.

Rolling Mill Jim.

Hubbard Steel Foundry Co.

EAST CHICAGO, IND.

All Kinds of Iron and Steel Rolls and Steel Castings.

Say you saw it in THE IRON TRADE REVIEW

Along the Middle Atlantic Seaboard

ALBANY, N. Y.—A $100,000 plant will be erected by the Albany Perforated Wrapping Paper Co. The proposed structure will be 1-story high and 120 x 300 feet, according to plans of George F. Hardy, architect, 309 Broadway, New York.

BALDWINSVILLE, N. Y. — The Morris Machine Works, East Genesee street, is receiving bids on the construction of a 1-story, 100 x 210-foot foundry, and is in the market for foundry and forge shop equipment. The building will cost about $25,000. Smith & Caffrey, Syracuse, N. Y., are the architects.

BROOKLYN, N. Y. — The Pioneer Iron Works has completed plans for a $12,000 blacksmith and machine shop. J. C. Wandell, 8526 Fourth avenue, is architect.

BROOKLYN, N. Y.—The Sterling Tool Co. has awarded the general contract for a $5000 plant extension, 3 stories high, 25 x 60 feet, to J. Rabinowitz, 743 Thirty-ninth street.

BROOKLYN, N. Y.—The National Lead Co., of which E. I. J. Cornish, 111 Broadway, New York, is president, will build a factory in Brooklyn. William Higginson, 21 Park Row, New York, is architect and engineer.

BUFFALO.—The General Metals Co., recently incorporated, plans to build a factory at 1549 Niagara street. A. N. Steiner is interested.

BUFFALO.—Bids are being taken by the Cousins & Son Boiler Works, 74 Wabash street, for the construction of a 1-story, 85 x 125-foot concrete boiler factory to cost $25,000.

GLENDALE, N. Y.—The Anchor Corrugating Construction Co., 140 Washington street, New York, will erect a $3500 metal working shop here, for the James A. McCafferty & Sons Mfg. Co., 505 Briggs avenue, Brooklyn.

LONG ISLAND CITY, N. Y.—The G. I. Stuebner Iron Works will construct a $15,000 addition to its plant. The building will be a 1-story, brick structure, 50 x 200 feet.

LONG ISLAND CITY, N. Y.—The Irving Iron Works will build an extension to its shops, to cost $3000.

MARINERS HARBOR, S. I., N. Y.—Plans have been completed for the erection of five factory buildings, each 4 stories high and 100 x 125 feet in size for the Proctor & Gamble Mfg. Co., Cincinnati. The Ferro Concrete Construction Co., Cincinnati, will be in charge of the construction.

NEWBURG, N. Y.—The Vulcan Tool & Machine Works recently has been incorporated with $50,000 capital by R. P. Barret, W. C. Whitney and E. C. Chadborn.

NEW YORK.—Plans are being drawn by Louis A. Hornum, architect, 405 Lexington avenue, for a machine shop to cost $7000, to be built by Joseph A. Bolch, 181 Christopher street.

NEW YORK.—Magid Bros. & Kleinman have been incorporated with $9000 capital to operate a metal spinning and stamping plant. L. Kleinman, H. and M. Magid, 747 East 182 street, are interested.

NEW YORK.—A charter has been granted to the Duplexalite Corp., organized with $275,000 capital to manufacture gas and electric lighting fixtures, by L. Roche, L. C. Bunzl and H. O. Walter, 60 Wall street.

NEW YORK.—A charter has been granted to the Stieglitz-Trieber Co., organized with $70,000 capital to engage in the smelting and refining of metals. The incorporators are F. J. Trieber, L. and A. Stieglitz, 228 Pearl street.

NEW YORK.—A charter of incorporation has been granted to the A. W. Moyer Co., Inc., capitalized at $50,000. The company will manufacture machinery and tools. The incorporators include W. P. Moran, 433 West Fifty-seventh street, New York, and others.

NEW YORK.—W. P. Harris & Co., 113 East 138th street, have had plans prepared by F. G. C. Smith, architect, Smith building, Greenwich, Conn., for a 3-story factory extension 25 x 50 feet, to their plant at Walton avenue and 138th street. The building will be of brick fireproof construction, and will cost $20,000.

NIAGARA FALLS, N. Y.—The McKinney-McQuire Construction Co. has the general contract for the construction of a storage building for the Union Carbide Co., of which George O. Knapp, 30 East Forty-second street, New York, is president.

OSWEGO, N. Y.—The Ames Iron Works plans to build an addition to its foundry, to be 50 x 250 feet. The company manufactures steam engines.

POUGHKEEPSIE, N. Y.—The Duesenberg Motors Corp., Elizabeth, N. J., has purchased the plant of the Fiat Motor Car Co., in this city. The Duesenberg corporation, in addition to this expansion, plans to double the capacity of its Elizabeth, N. J., plant at once. The corporation builds airplane, automobile and marine engines.

ROCHESTER, N. Y.—The Iroquois Foundry Co., 108 Browns Race, is having plans prepared for the rebuilding of its plant, which was damaged by fire recently with a loss of $45,000.

WATERTOWN, N. Y.—A charter of incorporation has been granted to Lawrence & Hill capitalized at $50,000, to operate a machine shop. W. M. Lawrence, L. L. Lawrence, 127 West Flower avenue, and A. W. Hill, 324 Academy street, are interested.

BELLWOOD, PA.—The John J. Irvin Co. plans to equip a machine shop in a building it has recently built. The firm is composed of John J. Irvin and Frank D. Miller.

BERWYN, PA.—The F. A. Havens Co. is receiving bids on a foundry building to be erected for the American Bronze Co.

BRADFORD, PA.—The boiler shops of the Boviard & Seyfang Mfg. Co. have been severely damaged by fire, which caused a loss of $10,000, Feb. 27.

BROWNSVILLE, PA.—The 2-story frame foundry of the J. R. Herbertson's Sons Co. has been damaged by fire with a loss estimated at $30,000. The company has been making castings for ships and mining machinery and patterns for these, valued at $10,000, were damaged.

DUNMORE, PA. — The Perpetual Spark Plug Co., 334 East Drinker street, has had plans drawn by the Duckworth Bros. Co., architects, 1 Exchange building, Scranton, Pa., for a 2-story factory, 30 x 186 feet, to cost $30,000. Bids will be called for shortly by the architects.

HOBOKEN, PA. — The Blaw-Knox Co., manufacturer of industrial buckets and pressed steel products, plans to build a 1-story mill to be 120 x 500 feet. C. G. Campbell is in charge.

HUNTINGTON, PA.—The Aetna Explosives & Chemical Co., according to a report, plans to build a $500,000 plant in this city, which is to be turned over for the manufacture of dyes and chemicals after the war, when the demand for smokeless powder decreases.

LATROBE, PA.—Bids are being received by Al. Francis, 41 Conestoga building, Pittsburgh, for a foundry to be built by the Peerless Foundry Co., of which he is manager. The building will consist of a 1 and 2-story molding department 85 x 275 feet, a power house 30 x 80 feet, and a core oven room 30 x 80 feet. The structure will cost about $150,000.

NEW MILTON, PA.—The Tri-County Oil & Gas Co. has been chartered with a capital stock of $25,000. C. L. Pearcy, Earl Pearcy, Clarence Fitzwilliams, B. I. Hudkins and R. J. Nutter are the incorporators.

PITTSBURGH, PA.—A. B. Pegrament has purchased six acres of land in Neville Island, upon which a plant for the manufacture of lubricants will be erected by the Standard Animal Products Co.

PITTSBURGH.—Plans have been drawn by Bernard H. Prack, architect and engineer, Keystone building, for a $50,000 addition to the factory of the Westinghouse Electric & Mfg. Co., Shadyside, Pittsburgh.

PHILADELPHIA.—C. V. Roberts has obtained a permit to build a machine shop to cost $10,000 at Church and Lackawanna streets.

PHILADELPHIA. — L. M. Lieberman's Sons are having plans drawn for a $5000 addition to their power house.

PHILADELPHIA.—The Quaker City Iron Works will erect a 1-story, 59 x 67-foot addition to its plant.

PHILADELPHIA. — A permit has been granted to the Tioga Steel & Iron Co., 3017 North Broad street, for a factory addition to cost $8000.

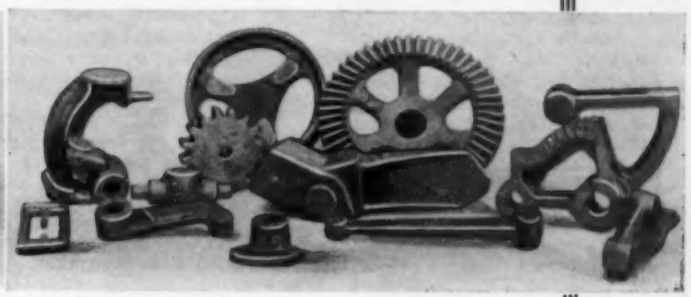
PHILADELPHIA.—The John T. Lewis Co. has secured a permit to erect a furnace house to cost $20,000 at Aramingo and Huntingdon streets.

PHILADELPHIA. — A permit has been granted to Shane Bros. & Wilson, Sixty-third and Market streets, for the erection of a boiler house.

PHILADELPHIA.—The Keystone Supply & Mfg. Co., 919 North Ninth street, plans to add a 2-story factory to its plant. Plans are being drawn by F. E. Hahn, architect and engineer, 1112 Chestnut street.

PHILADELPHIA.—The Pecora Paint Co. has purchased from Samuel B. Bowen several factory buildings at Sedgley avenue and the North Penn railroad, which it will equip for the manufacture of its product.

PHILADELPHIA. — Valuable patterns of castings being made for the government were destroyed in a fire which damaged the Albert Clark Iron Foundry, Thirty-fifth street and Grays Ferry avenue, Feb. 28. The core



Parts—motor-truck, tractor machine-tool—will be stronger if made the Farrell-Cheek way

Farrell-Cheek Castings are cast to obtain the greatest resilient strength with minimum weight, thus increasing both safety and endurance qualities.

We are also manufacturers of
Blank Gears; Carbonizing Boxes and Case Hardening Boxes.

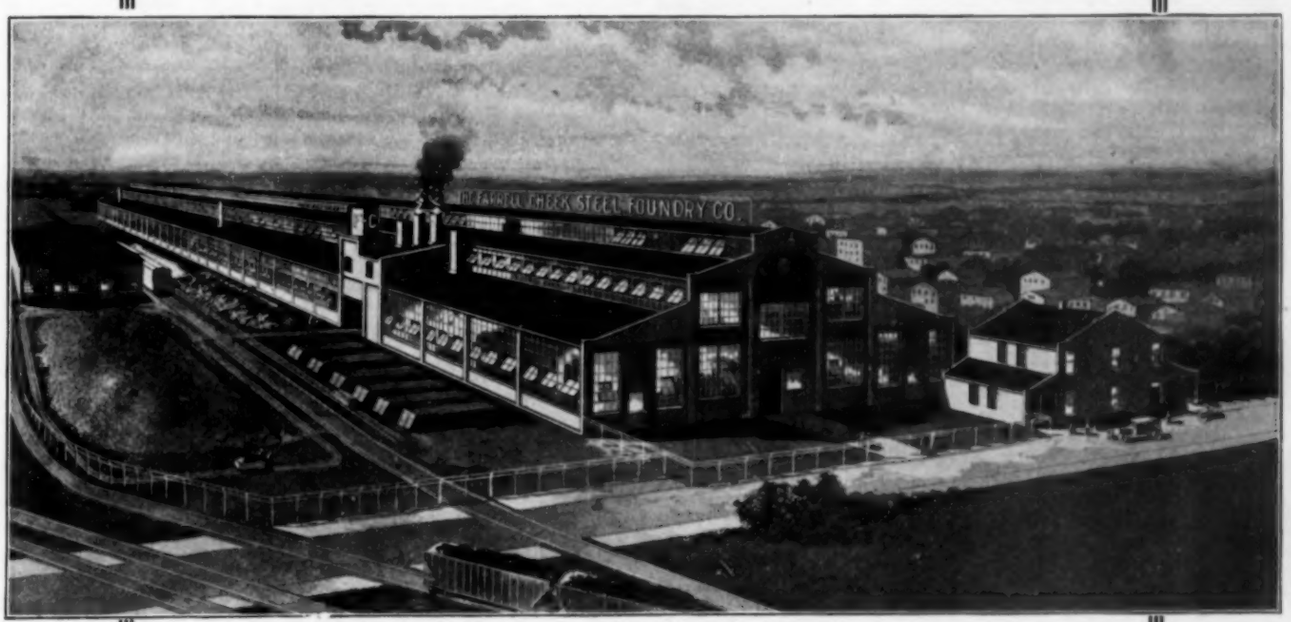
Write for Quotations

Farrell-Cheek Steel Foundry Co.

SANDUSKY, OHIO

Branch Offices

New York Philadelphia Chicago



oven, in which the fire started, will have to be replaced. Total damage is estimated at $3000.

SHARON, PA.—The Sharon Clay Products Co. has increased its capital by $100,000 to provide for enlarging the capacity of its brick plant. George Collard is in charge.

SHARON, PA.—The Concrete Brick & Fence Post Co., Wheeling, W. Va., plans to build a factory here. Theo. Smith, 2909 Jacob street, Wheeling, is in charge.

TITUSVILLE, PA. — The American Radiator Co., 8205 Michigan avenue, Chicago, has awarded to the J. W. Cowper Co., Inc., 725 Fidelity building, Buffalo, contract for a 1-story, 80 x 100-foot factory to cost $25,000, which it will build at Titusville.

WILLIAMSPORT, PA. — The National Foundry Mfg. & Supply Co. plans to rebuild its plant at Hepburn and Canal streets, which was damaged by fire recently, and has awarded the contract to Meredith Hannan, 461 Elmira street. The new structure will be 1-story, 48 x 116 feet, to cost $10,000.

NEWARK, N. J.—The Natural Carbonic Gas Co., McClellan street, has had plans prepared for a 1-story factory addition 30 x 80 feet.

WILMINGTON, DEL.—The Du Pont Powder Co., Du Pont building, is in the market for six or eight locomotive cranes to be used in the construction of a powder plant for the government.

WILMINGTON, DEL.—A building at the plant of the Midvale Steel & Ordnance Co. was recently wrecked by a gale. The building was 70 x 580 feet and was constructed of brick and steel. The loss is estimated at $75,000.

NORFOLK, VA.—The erection of a $50,000 plant, 1 and 2 stories high, is contemplated by the Norfolk Glass Mfg. Co. J. Wiley Halstead is president of the company.

NORFOLK, VA.—Bids now are being received by the Linde Air Products Co., Forty-second street building, New York, for the construction of a $50,000, 1 and 2-story plant in this city.

PORT NORFOLK, VA.—The Smith Shipbuilding & Dry Dock Co. is having plans drawn by Benjamin K. Mitchell, architect, for the construction of a $25,000 addition to its plant.

Activities in the Central States

BEAVER DAM, WIS.—The plant formerly operated as a machine shop and blacksmith shop by the J. S. Rowell Mfg. Co. has been sold to Edward Herzberg and Albert A. and Otto E. Klatt, who will remodel the shop and equip it as a gray iron foundry and a machine shop.

DE PERE, WIS.—The Lawton Co. plans to enlarge its plant for the manufacture of gray iron castings by the addition of a machine shop and a pattern shop. The latter will replace the building damaged by fire recently. The machine shop will require considerable new equipment.

FOND DU LAC, WIS.—The Northern Casket Co., manufacturer of metal coffins, has had plans prepared for a plant addition. W. Mauthe is general manager.

KAUKAUNA, WIS. — The Kaukauna Machine Works and Mayer Bros., Inc., have been united under the name of the Kaukauna Machine Works Co. with $50,000 capital, and will add to the equipment of the present plants.

KENOSHA, WIS.—The Simmons Co., a large manufacturer of metal beds and springs, has added $3,000,000 to its capital stock, which now amounts to $13,000,000. The company is incorporated under the laws of Delaware.

KENOSHA, WIS. — The Winther Motor Truck Co., Winthrop Harbor, Ill., has purchased a site in Kenosha and will start work at once on the erection of a new motor truck plant costing about $125,000. The Winther company has taken large contracts for military trucks.

LAKE GENEVA, WIS.—Reinert & Malsch, Lake Geneva, have received the contract for constructing a $20,000 bridge on Lake street, at the foot of Broad street. F. A. Briegel is city clerk.

MADISON, WIS.—The De-Electric Mfg. Co., 24 Vrooman block, plans to build a factory. H. A. Smythe Jr. is secretary of the company.

MENOMONIE, WIS. — Plans for a cooperative central heating plant, to be built at a cost of about $75,000, are being completed by Thomas L. Thorsen, Stout institute, Menomonie. Plans call for an initial installation of eight 1200-horsepower boilers with space for four additional units. The building will be 114 x 174 feet, of brick and concrete, with a 175-foot stack. The equipment throughout is to be automatic, including coal and ash handling apparatus, conveyors, stokers, etc. Definite action on the project is held in abeyance until figures of actual costs are available.

MILWAUKEE.—Articles of incorporation have been filed by the General Tool & Mfg. Co. The capital stock is $15,000 and the incorporators are George H. Ahlswede, E. J. Stanek and Fred Zinzow.

MILWAUKEE.—Klug & Smith, consulting engineers, Mack block, are preparing plans for a building, 50 x 300 feet, two stories and basement, at Muskego avenue and North Canal street, for the Milwaukee-Western Fuel Co., 14 Grand avenue. The building will contain a machine shop, and equipment will include a small traveling crane.

MONTFORT, WIS. — The Chicago & Northwestern railroad is completing surveys for a new roundhouse of larger size than the one now in use.

NEENAH, WIS.—The Bruce Boiler Works has been organized by W. A. Bruce and has taken over the main plant of the Pomeroy Paper Mills Co., which will be equipped for structural, boiler and ornamental iron manufacture.

REEDSBURG, WIS.—Sealed bids are being received by Wm. H. Dierken, city clerk, for furnishing cast iron water mains and fittings.

STANLEY, WIS.—The Badger Chemical Co. of Wisconsin has been organized with a capital stock of $500,000 by Chicago and Milwaukee capital and is now completing plans for the establishment of a charcoal, potash, wood alcohol and general chemical refining plant. The company is represented by A. E. Kopps, Bernard Rosenow and Charles Friend, attorney, Milwaukee.

STOUGHTON, WIS. — The Stoughton Wagon Works has been severely damaged by a fire which caused a loss of several thousand dollars. The cupola room of the foundry was damaged most severely.

WATERTOWN, WIS.—The Globe Milling Co., owned by the Shane Bros. & Wilson Co., Minneapolis, will install an additional hydroelectric generator to operate its plant throughout. George Manschot is general manager.

WATERTOWN, WIS.—As soon as weather conditions permit, the Otto Biefeld Co. will begin work on the construction of a brick and steel addition, 66 x 214 feet in size, to provide a foundry to supplement its present boiler, structural and machine shops.

WAUSAU, WIS.—The common council is considering the proposal of the Lull Truck Co., a new motor truck manufacturing concern, to lease the brick and concrete factory erected on city property several years ago but which has been idle for a year or more.

DETROIT.—The Meyers Auto Accessory Co., 35 Twentieth street, proposes to build a 2-story factory 40 x 120 feet.

DETROIT.—The Inland Metal Products Co. has increased its capital from $75,000 to $200,000 to provide for plant expansion.

DETROIT.—The Austin Co., 14320 Euclid avenue, Cleveland, has been awarded a contract for the erection of a 100 x 180-foot building, to cost $25,000, for the Central Aluminum & Brass Mfg. Co.

DETROIT.—Plans have been prepared by Smith, Hinchman & Grylls, architects, 710 Washington arcade, for a factory, assembly room and repair shop to be built by the Denby Motor Truck Co., 443 Holbrook avenue. E. E. Tent is manager of the company.

NILES, MICH.—The Towar Cotton Mills is taking bids on a factory addition, for which plans are being drawn by R. A. Le Roy, Pratt building, Kalamazoo, Mich.

BELLEVILLE, ILL. — The Orben Stove Co., recently incorporated with a capital of $50,000, plans to build a foundry shortly. Incorporators are J. A. Langfelder, J. A. Mueller and others.

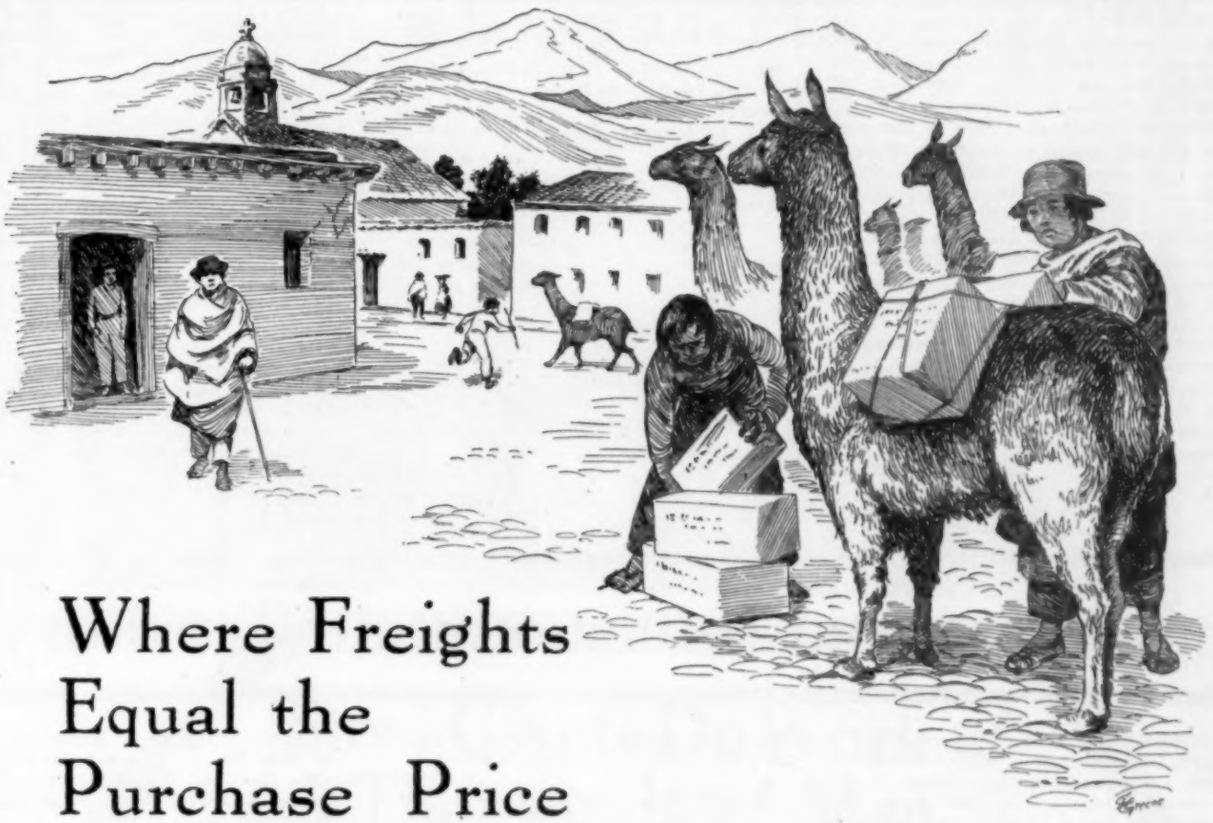
CAIRO, ILL.—The Vehicle Supply Co., whose plant was recently damaged by fire with a loss of $60,000, plans to rebuild shortly.

CHICAGO.—Plans are being drawn by Lebenbaum, Marx & Vigeant, architects, 175 West Jackson boulevard, for the factory to be built by the Ilg Electric Ventilating Co., 147 Whiting street.

CHICAGO.—The Amalgamated Machinery Corp., 7210 Adams street, has had plans prepared by W. H. Warner, architect, 10 South La Salle street, for a 1-story brick addition to its assembling plant. Cost of the proposed structure is estimated at $40,000.

PEORIA, ILL. — The Electrical Testing Co., 350 Knoxville avenue, has awarded the contract for a 1-story repair shop to be 60 x 180 feet in size and cost $10,000.

FRANKFORT, IND.—McGaw & Stevenson, architects, 318 Citizens Bank building, Kokomo, Ind., have prepared plans for a 1-story addition, 14 x 60 feet to the municipal



Where Freights Equal the Purchase Price

There is many a place in the world where the costs of freights are more than the original price of the goods. Picture to yourself the merchant who has paid his money and waited six months for the delivery of an order, when those cases arrive. Will he find the contents in good condition; will they have passed the customs without added imposts, and will they have come through a dozen hands without pilfering?

Proper packing for export is one of the most important phases of our international trade. It rightly belongs to the manufacturer to case and mark his shipments correctly and those who have had experience in exporting do so. But the man who seldom receives an order from overseas is, too often, inclined to think that his packing case, that has proved satisfactory for domestic delivery, will do for foreign shipment.

Almost every condition in foreign freight delivery is more severe than in our American service. The exporting houses know these conditions and the shipping instructions they furnish are made to comply with the particular requirements in each case. If these instructions are not followed, the buyer abroad will have to face excessive import fines, the damage of goods and delays in delivery that destroy his confidence in America's vaunted business ability.

"Export Packing" a booklet prepared by our Order Department gives many hints on proper packing for export. It will be sent free to anyone interested in the subject.

FEDERAL EXPORT CORPORATION

115 BROADWAY - - NEW YORK

lighting plant. The addition will cost, with equipment, about $5000.

INDIANAPOLIS.—The American Die Casting Co. has been incorporated with a capital of $100,000 to manufacture die castings. The incorporators are Lawrence Olsen, L. C. Olsen and William R. Jenkins.

INDIANAPOLIS.—A charter of incorporation has been granted to the Briant Specialty Mfg. Co., capitaliezd at $20,000, to manufacture metal specialties. The incorporators are Briant Sando, H. G. Parker and others.

INDIANAPOLIS. — The Parker Tire & Rubber Co. contemplates building a 1-story factory 100 x 400 feet at Southeastern avenue and the Belt railway. The structure will be of reinforced brick and concrete. P. R. Parker, 1014 Merchants Bank building, is president of the company.

KENTLAND, IND.—The Exhibitor Mfg. Co. has been incorporated with a capital of $40,000 to manufacture machinery. The incorporators are Amos D. Morris, C. M. Holloway and others.

KOKOMO, IND. — The Liberty Pressed Metal Co. has been chartered with a nominal capital of $5000 to manufacture pressed metal products. The incorporators are J. W. Johnson, A. G. Seiberling, J. P. Grace and others.

MUNCIE, IND. — The Indiana Steel & Wire Co., South Council street, has increased its capital stock from $150,000 to $450,000 to provide for proposed additions to its plant.

PERRYVILLE, IND. — The Perryville Stove Co. will take bids about March 15 through E. U. Garrett, architect, 9 West Harrison street, Danville, Ill., for a factory addition to include a foundry, machine shop and cleaning room. These departments will be 1-story, 50 x 100, 50 x 100, and 30 x 50 feet, respectively. C. H. Cochran is manager of the plant.

BALLVILLE, O.—The American Gas & Electric Co., 30 Church street, New York, plans to build a power house here to be 25 x 25 feet and cost $10,000.

CINCINNATI.—A charter of incorporation has been granted to the Troy Metal Products Co., capitalized at $300,000. Incorporators include A. G. Stouder, W. H. Bowyer, J. E. Edgar, C. C. Willard and J. M. Spencer.

CLEVELAND.—The Unit Power Wheel Co. has been organized by Don B. Alexander and W. K. Stanley. The company is capitalized at $1000, nominally.

CLEVELAND.—The Gordon Propeller & Mfg. Co. has been incorporated with a capital of $25,000 by F. C. Senick, J. O. Smith, W. G. Smith, Harry E. Moore and P. J. Hemler.

CLEVELAND.—The Elyria Iron & Steel Co. has taken an option on a 2-acre site adjoining its plant at East 131st street and the Belt line railroad. The company plans to enlarge its plant, according to reports.

CLEVELAND.—Benjamin Moore & Co., paint and varnish manufacturers, Marquette road, have purchased a site in the south end on which they propose to erect a large plant to take care of increased business.

CLEVELAND.—A permit has been granted to the American Ball Bearing Co., West Eighty-third street and the New York Central railroad, to build a plant addition to cost about $6000.

Western and Intermountain Territory

FOLEY, MINN.—The citizens will vote March 12 on the sale of $20,000 in bonds to build a waterworks system. George E. Rice is mayor. Plans have not been drawn.

MINNEAPOLIS.—The Gas Traction Foundry Co. is taking bids through Albert W. Potter, superintendent, 2907 South East Fourth street, on the erection of a 1-story 100 x 300-foot foundry addition to be built at a cost of $70,000. Plans have been prepared by W. L. Alban, Endicott building, St. Paul.

ST. CLOUD, MINN.—The Pan Motor Co. will start work shortly, on the erection of a drop forge shop and a die shop. George Booth is the company's engineer in charge.

STILLWATER, MINN. — The Twin City Forge & Foundry Co. is building a factory 130 x 400 feet in size, to cost $50,000.

DAVENPORT, IOWA.—The J. P. Hand Co., capitalized at $20,000, has been chartered to manufacture storage batteries and automobile parts by J. P. Hand, B. Simmon and Joseph Lewis.

KANSAS CITY, MO.—The Witte Engine Works, manufacturer of gas engines, has awarded a contract for a 1-story addition to cost $10,000.

ST. LOUIS. — The Bridge & Beach Mfg. Co., Valentine and Poplar streets, has bought a 10-acre site on which a new plant will be erected.

ST. LOUIS.—The Hosch Mechanism Corp., Olive and Fifteenth streets, capitalized at $200,000, has been chartered to manufacture computing machinery. G. C. Hosch and W. E. Hosch are interested.

TEXARKANA, ARK.—The Williams Mill Mfg. Co. has awarded to Harris & Echols, engineers, a contract to build a 36 x 285-foot factory for the manufacture of farm machinery. The building will be of reinforced concrete with sawtooth roof, and will cost $30,000 with equipment.

BLACKWELL, OKLA.—The city plans to build extensions to its electric light and waterworks plants to cost $82,500 and $77,500, respectively. Clyde Butcher is city clerk.

New Business in Eastern Canada

BADEN, ONT.—Elias A. Brubacher will build a mill and will require machinery to cost $20,000, to replace that damaged by fire a short time ago.

BRANTFORD, ONT.—The Flax Harvester Co., Ltd., has been incorporated to manufacture machinery for use in the production of flax with $1000 nominal capital. Thomas H. Tombyll, John B. Pickering, William D. Christianson and others, are interested.

GANANOQUE, ONT. — The Gananoque Spring & Axle Co. is rebuilding its forge shop recently damaged by fire.

HAMILTON, ONT.—The Canadian Shovel Co., Imperial street, has awarded contracts for the erection of an addition to its plant, to cost $25,000.

LONDON, ONT. — The London Street Railway Co. is in the market for electrical equipment for use in rebuilding a number of cars. C. B. King is manager.

OWEN SOUND, ONT.—The Great Lakes Steel Corp., 22 King street east, Toronto, Ont., will commence about April 1 on the erection of a large steel plant at Owen Sound.

PETERBORO, ONT.—The plant of the Peterboro Milling Co. was badly damaged by fire Feb. 25, together with considerable valuable machinery. The plant will be rebuilt and the machinery replaced. The loss was about $30,000.

PORT COLBORNE, ONT.—The second ore bridge of the Canadian Furnace Co. was severely damaged by a gale which swept the district Feb. 26, causing a loss to the company of $100,000.

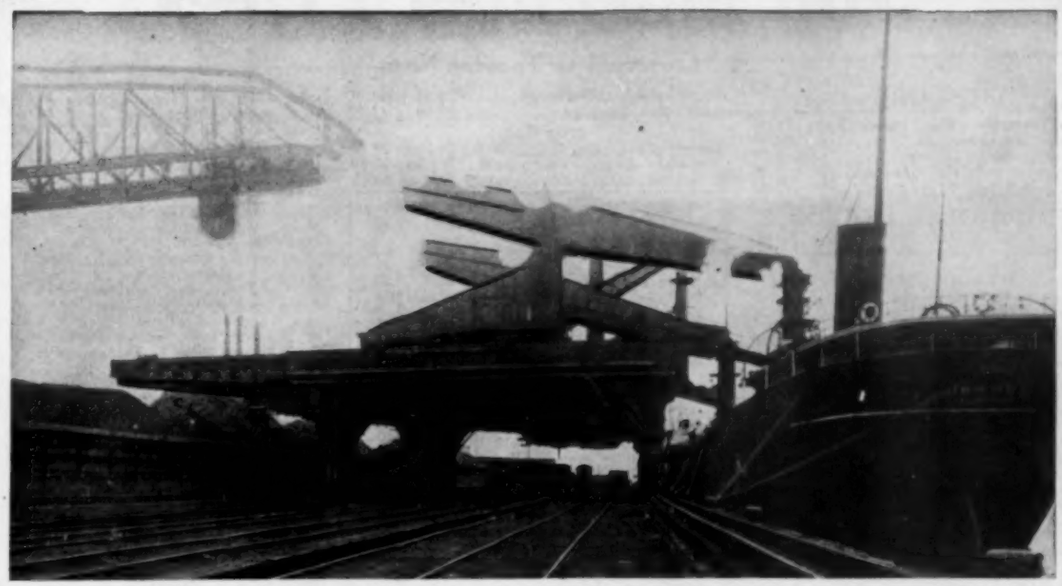
TORONTO, ONT.—The E. B. Shuttleworth Chemical Co., 19 Dundas street east, is in the market for electric motors.

TORONTO, ONT. — The Commonwealth Steamship Co. has been incorporated to build ships with $750,000 capital stock. Joseph M. Bullen, William Levy, Harold L. Steele and others are interested.

TORONTO, ONT.—The Acme Engineering Co. has been incorporated to manufacture tools, machinery and electrical equipment with $125,000 capital. Ewart R. Lynch, Traders Bank building, D. B. Coleman, F. A. D. Campbell and others are interested.

TORONTO, ONT.—The Ohio-Tuec Vacuum Cleaner Co. has been incorporated to manufacture vacuum cleaners, machinery and tools, with $50,000 capital. Joseph M. Bullen, 44 King street west, Harold L. Steele, W. Osborne and others are interested.

TORONTO, ONT. — Considerable damage was done to factories along the Don river, which overflowed its banks Feb. 26. Among the companies to suffer by water were the Sheet Metal Products Co. of Canada, $50,000 loss; the Wm. Davies Co., $10,000; Wickett & Craig, $7500; the Conduits Co., $5000; the Toronto Plate Glass Mfg. Co., $4000.



Steel Giants Do Work of Thousands of Men

All of the large modern ore docks constructed during the last six years have been equipped with **Hulett Boat Unloaders.** These machines have become a standard for unloading Iron Ore, and ***they are equally well adapted for unloading Coal.***

Hulett Unloaders are built in the following sizes and guaranteed capacities: **For Ore:** *17-Ton Buckets*, capacity 1,250,000 tons per season; *15-Ton Buckets*, capacity 1,000,000 tons per season; *10-Ton Buckets*, capacity 750,000 tons per season. **For Coal:** *8-Ton Buckets*, capacity 500,000 tons per season.

Hulett Unloaders require (1) fewest number of men, (2) lowest labor cost per ton, (3) lowest power cost per ton, (4) lowest maintenance cost per ton.

Complete Ore and Coal Handling Stations, equipped with Boat Unloaders, Car Dumpers, Rehandling Bridges, etc., are a specialty of The W-S-M Company.

Bulletins are in preparation on Ore and Coal Handling Machinery. *Send for your copies.*

The four Unloaders pictured above constitute the Pennsylvania Railway's Whisky Island installation at Cleveland, Ohio.

Principal Products of The W-S-M Company

Steel Plant Equipment:
Manipulators, Furnaces, Charging Machines, etc.
By-Product Coke Oven Machinery.
Shipyard Cranes.
Hoisting and Mining Machinery.
Ore and Coal Handling Machinery.
Special Large Cranes.
Gas Producers, Gas Valves.
Hydraulic Turbines.
Johnson Hydraulic Valves.
Steel Castings.

WELLMAN SEAVER MORGAN COMPANY
CLEVELAND
OHIO U.S.A.

Iron and Steel Prices

Corrected to Tuesday Noon

IRON ORE

Superior Ores, Per Ton, Lower Lake Ports

Old range Bessemer, 55 iron	$5.95
Mesabi Bessemer, 55 iron	5.70
Old range non-Bess., 51½ iron	5.20
Mesabi non-Bess., 51½ iron	5.05

WAREHOUSE PRICES

Steel bars, Chicago	4.10c
Steel bars, Cleveland	4.035c
Steel bars, Detroit	4.085c
Steel bars, Philadelphia	4.10c
Steel bars, New York	4.095c
Steel bars, St. Louis	4.17c
Steel bars, Cincinnati	4.085c
Steel bars, St. Paul	4.22c
Steel bars, Buffalo	4.05c
Iron bars, Buffalo	4.65c
Iron bars, Chicago	4.10c
Iron bars, Cleveland	3.985c
Iron bars, Detroit	4.75c
Iron bars, St. Louis	4.17c
Iron bars, Cincinnati	4.085c
Iron bars, Philadelphia	4.50c
Iron bars, New York	4.659c
Shapes, Chicago	4.20c
Shapes, Detroit	4.185c
Shapes, St. Louis	4.27c
Shapes, St. Paul	4.32c
Shapes, New York	4.195c
Shapes, Cleveland	4.135c
Shapes, Philadelphia	4.20c
Shapes, Buffalo	4.15c
Shapes, Cincinnati	4.185c
Plates, Buffalo	4.40c
Plates, Chicago	4.45c
Plates, Detroit	4.435c
Plates, St. Louis	4.52c
Plates, St. Paul	4.57c
Plates, New York	4.445c
Plates, Cleveland	4.385c
Plates, Philadelphia	4.45c
Plates, Cincinnati	4.435c
No. 10 blue anl. sheets, Chi.	5.45c
No. 10 blue anl. sheets, Cleve.	5.385c
No. 10 blue anl., Buffalo	5.40c
No. 10 blue anl., sheets, St. L.	5.52c
No. 10 blue anl. sheets, Cinci.	5.435c
No. 10 blue anl. sheets, St. Paul	5.57c
No. 10 blue anl. sh., Detroit	5.435c
No. 28 black sheets, Chgo.	6.45c
No. 28 black sheets, Cleve.	6.385c
No. 28 black sheets, Cinci.	5.45c
No. 28 black, Detroit	6.435c
No. 28 black sheets, St. L.	6.52c
No. 28 black sheets, St. Paul	6.57c
No. 28 galv. sheets, Chgo.	7.70c
No. 28 galv. sheets, Cleve.	7.635c
No. 28 galv. sheets, Cinci.	6.635c
No. 28 galvanized, Detroit	7.685c
No. 28 galv. sheets, St. L.	7.77c
Hoops, Cleveland	4.885c
Hoops, Detroit	4.935c

IRON AND STEEL SCRAP

STEEL WORKS USE

(Gross Tons)

Bundled sheets, Pittsburgh	$22.00 to 23.00
Bundled sheets, Cleveland	24.50 to 25.25
Bundled sheets, Buffalo	22.00 to 24.00
Boiler plate, cut, No. 1 Chgo.	24.50 to 25.50
City wrought, short, N. Y.	27.50 to 28.00
Frogs, switches, guards, St. L.	29.50 to 30.00
Frogs, switches, guards, Chgo.	30.00
Heavy melting steel, Pitts.	30.00
Heavy melting steel, Buffalo	30.00
Heavy melting steel, Chgo.	30.00
Heavy melt'g steel, Cleveland	30.00
Heavy melting steel, Cinci.	27.00 to 27.50
Heavy melt'g steel, east. Pa.	30.00
Heavy melting steel, N. Y.	29.50 to 30.00
Heavy melting steel, St. L.	29.50 to 30.00
Heavy melting steel, Birming.	24.00 to 27.00
Hydraulic press. sheets, Cleve.	28.50 to 29.50
Hydraulic press. sheets, Pitts.	27.00 to 28.00
Hydraulic press. sheets, Chgo.	27.00 to 27.50
Knuckles, couplers, Chgo.	35.00
Low phos. steel, Buffalo	40.00
Low phos. steel, Pittsburgh	40.00
Low phos. steel, eastern Pa.	40.00
Shoveling steel, Chicago	30.00
Shoveling steel, St. Louis	29.50 to 30.00
Springs, Chgo.	35.00
Steel rails, short, Chicago	34.50 to 35.00
Steel rails, short, Cleveland	32.00 to 33.00
Steel rails, short, St. Louis	34.00 to 35.00
Steel rails, old, Birmingham	28.00 to 30.00
Stove plate, Chgo.	24.50 to 25.50
Stove plate, Cincinnati	19.50 to 20.00
Stove plate, St. Louis	20.50 to 21.00
Stove plate, N. J. points	22.50
Stove plate, Birmingham	18.00 to 21.00
Stove plate, Buffalo	25.00
Stove plate, eastern Pa.	23.00 to 24.00
Stove plate, Cleveland	28.50
Stove plate, Pittsburgh	20.00 to 21.00
Cast iron borings	11.00 to 12.00

(Net Tons)

Boiler plate, cut, No. 1, St. L.	24.50 to 25.00
Bundled sheets, Cincinnati	20.00 to 20.50
Knuckles, coup., St. Louis	31.00 to 31.25

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:

Cleveland	$0.95
Newark, N. J.	3.50
Boston	3.70
Philadelphia	3.30
Pittsburgh	.95
St. Louis	3.18
Minneapolis, St. Paul	4.54

Buffalo to:

Albany, N. Y.	$1.26
New England (rail)	3.10
New York and Brooklyn (rail)	3.10

Virginia furnaces to:

Philadelphia	$3.27
New England	3.77
Brooklyn, Jersey City, Newark	3.52

Birmingham, Ala., to:

Boston	6.00
Cincinnati	2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
Minneapolis, St. Paul	5.85
New York (r. and w.)	6.00
Philadelphia (r. and w.)	5.25
Pittsburgh	4.90
Savannah, Ga.	2.75
St. Louis	3.40

Chicago to:

Des Moines	$2.80
Milwaukee	.50
Minneapolis, St. Paul	2.00
Moline, Ill.	1.15
Omaha	3.58
St. Louis	1.58

Ironton and Jackson, O., to:

Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58
Minneapolis, St. Paul	4.54

Duluth, Minn., to:

Minneapolis- St. Paul	$1.25

Mayville, Wis.:

Minneapolis-St. Paul	$1.75

Freight Rates, Finished Material

Pittsburgh, carloads, per 100 lbs., to:	
New York	19.5 cents
Philadelphia	18.5 cents
Boston	21.5 cents
Buffalo	16.0 cents
Baltimore	18.0 cents
Cleveland	13.5 cents
Cincinnati	17.0 cents
Chicago	21.5 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	82.5 cents
St. Louis	27.0 cents
New Orleans	30.0 cents
Birmingham	45.0 cents
Pacific coast (all rail)	75.0 cents
Pacific coast (tin plate)	75.0 cents

IRON MILL USE

(Gross Tons)

Angle bars, iron, Chgo.	40.00
Arch bars, transoms, Chgo.	38.00 to 39.00
Busheling, No. 1, Cleveland	32.00
Busheling, No. 1, Buffalo	30.00 to 31.00
Bushcling, No. 2, Buffalo	22.00 to 24.00
Busheling, No. 1, Pittsburgh	32.00
Busheling, No. 1, Chgo.	26.50 to 27.00
Busheling, No. 2 Chgo.	20.00 to 21.00
Cast borings, New York	17.00
Cast borings, eastern Pa.	20.00
Cast borings, Cleveland	20.00
Cast borings, Buffalo	19.00 to 20.00
Cast borings, Pittsburgh	20.00
Cast borings, Birmingham	12.00 to 15.00
Cast borings, Chgo.	18.50 to 19.00
City wrought, long, N. Y.	32.00 to 32.50
Cut forge, Chicago	33.50 to 34.00
Forge flashings, small, Cleve.	26.50 to 27.00
Forge flashings, large, Cleve.	27.50 to 28.00
Forge No. 1, eastern Pa.	27.50 to 28.50
Grate bars, Buffalo	25.00
Grate bars, Cleveland	21.50 to 22.50
Grate bars, N. J. points	22.50
Iron axles, Pittsburgh	42.00 to 44.00
Iron axles, Cincinnati	44.00 to 44.50
Iron axles, Cleveland	47.50
Iron axles, eastern Pa.	47.50
Iron axles, Chicago	47.50
Iron axles, Buffalo	45.00 to 47.00
Iron rails, Chicago	39.00 to 40.00
Iron rails, Buffalo	37.00 to 38.00
Iron rails, Cincinnati	33.00 to 33.50
Iron rails, St. Louis	34.00 to 35.00
Iron rails, Cleveland	35.00
Machine turnings, Cleve.	18.25
Machine turnings, Buffalo	18.00 to 18.50
Machine turnings, N. Y.	16.50
Machine turnings, Pitts.	20.00
Machine turnings, east. Pa.	19.50 to 20.00
Machine turnings, Birming.	17.00 to 18.00
Machine turnings, Chicago	18.50 to 19.00
Pipes and flues, Cleveland	25.50 to 26.50
Pipes and flues, Chicago	26.65 to 27.75
R. R. mch. cast, No. 1, Buff.	35.00
R. R. wrgt. No. 1, Buffalo	35.00
R. R. wrgt., No. 1, east, Pa.	35.00
Railroad wrgt., No. 1, Cleve.	35.00
R. R. wrought, No. 1, Pitts.	35.00
Railroad wr'ght, No. 1, Chgo.	35.00
Railroad wr'ght, No. 2, Chgo.	33.50 to 34.50
R. R. wrgt. No. 1, Birming.	27.00 to 30.00
Wrought pipe, Buffalo	28.00 to 29.00
Wrought pipe, eastern Pa.	34.00
Wrought pipe, ungraded, eastern Pa.	30.00

(Net Tons)

Angle bars, steel, St. Louis	34.50 to 35.00
Arch bars & transoms, St. L.	42.00 to 42.50
Busheling, No. 1, Cincinnati	24.00 to 24.50
Busheling, No. 1, St. Louis	26.50 to 27.00
Cast borings, Cincinnati	15.50 to 16.00
Cast borings, St. Louis	17.00 to 17.50
Iron axles, St. Louis	42.00 to 42.50
Machine turnings, Cinci.	15.50 to 16.00
Machine turnings, St. L.	17.50 to 17.85
Pipes and flues, St. Louis	26.25 to 26.75
Railroad wrgt., No. 1, Cinci.	30.00 to 30.50
Railroad wrgt., No. 1, St. L.	31.00 to 31.25
Railroad wrgt., No. 2, St. L.	30.00 to 30.40

IRON OR STEEL WORKS USE

(Gross Tons)

Axle turnings, Cleveland	$24.00 to 25.00
Axle turnings, Buffalo	25.00
Shafting, New York	37.50 to 38.00
Shafting, eastern Pa.	40.00
Steel car axles, Birmingham	32.00 to 33.00
Steel car axles, New York	45.50 to 46.00
Steel car axles, Buffalo	45.00 to 47.00
Steel car axles, Cleveland	45.00
Steel car axles, Pittsburgh	40.00 to 42.00
Steel car axles, eastern Pa.	47.50
Steel car axles, Chgo.	47.50

(Net Tons)

Shafting, St. Louis	42.00 to 42.50
Steel car axles, St. Louis	42.00 to 42.50

IRON FOUNDRY USE

(Gross Tons)

Car wheels, (iron), Pitts.	$30.00
Car wheels, (steel), Pitts.	33.00 to 35.00
Car wheels, eastern Pa.	30.00
Car wheels, Buffalo	30.00
Car wheels, Chicago	30.00
Car wheels, St. Louis	29.50 to 30.00
Car wheels, Birmingham	25.00 to 30.00
Car wheels, Cleveland	30.00
Tram car wheels, Birming.	21.00 to 25.00
Cast, No. 1 cupola east. Pa.	35.00
Cast, No. 1, cupola, Birming.	24.00 to 27.00
Cast No. 1, Cleveland	33.75
Cast, 1, heavy, N. J. points	29.50 to 30.00
Cast, 1, machy., N. J. points	30.00 to 31.00
Cast No. 1, Chicago	32.00 to 33.00
Cast, No. 1, Pittsburgh	28.00 to 29.00
Malleable, Cincinnati	30.00 to 35.00
Malleable, Cleveland	30.00 to 35.00
Malleable, Buffalo	30.00 to 35.00
Malleable, Pittsburgh	30.00 to 35.00
Malleable, east. Pa.	30.00 to 35.00
Malleable railroad, Chgo.	31.00 to 32.00
Malleable, agricultural, Chgo.	30.00

(Net Tons)

Cast, No. 1, Cincinnati	26.00 to 26.50
Cast, No. 1, St. Louis	26.50 to 27.00
Malleable railroad, St. Louis	26.25 to 26.75
Malleable agricultural, St. L.	26.50 to 26.75

MISCELLANEOUS USES

(Gross Tons)

Boiler punchings, Chgo.	36.50 to 37.50
Reroll. rails, 5 ft. & ov., Pitts.	35.00
Reroll. rails, 5 ft. & ov., Chgo.	35.00
Reroll. rails, 5 ft. & ov., E. Pa.	35.00
Reroll. rails, 5 ft. & ov., St. L.	34.00 to 35.00
Reroll. rails, 5 ft. or over, Cleve.	33.00
Rerolling rails, long, Birming.	37.50 to 38.50
Locomotive tires, Chgo.	43.00 to 44.00

(Net Tons)

Locomotive tires, St. Louis	39.50 to 40.00